"Siempre adelante"

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MODERN SUGAR MACHINERY

& C.

GEO. STADE,
Civil Engineer,
BERLIN: C. 2.

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Class

WITH COMPLIMENTS

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171686

The
PATENT-
Standard-Sand-Filter.

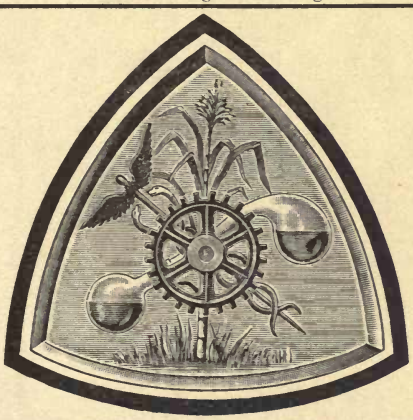
The simplest and most effective mechanical filter
— working without any stirring gear, strainer or cloth —
most economically for cleaning
sugar juice, syrup, refinery-liquor,
chemical solutions, beer,
for
feed water and water works etc.
with certificates of success in working and prices.

GEO. STADE,

Civil-Engineer & Technical Chemist,
Expert in Sugar & Spirit Manufacture & Refining,

Formerly Member of the Imperial Patent Office (Berlin); Correspondent of all leading Sugar Journals; Technical Adviser and Director of Sugar Works, Distilleries, and Experimental Stations.

Memb. Assoc. G. Engineers; Fellow G. Chemical Society;
Memb. Union Sugar Technologists.



Technical Departments for Sugar Works & Distilleries etc.
(Established 1888-formerly Geo. Stade & Co.): —

I: Cane & Beet Sugar Machinery.
II: Rum Distilleries - Spirit Refineries.
III: Stores - Fittings - Implements.
IV: Laboratories - Instrum. - Analyses.
V: Reports - Consultations - Patents.
VI: Representations - Agencies.

Bankers: "Deutsche Bank" Berlin (& London).

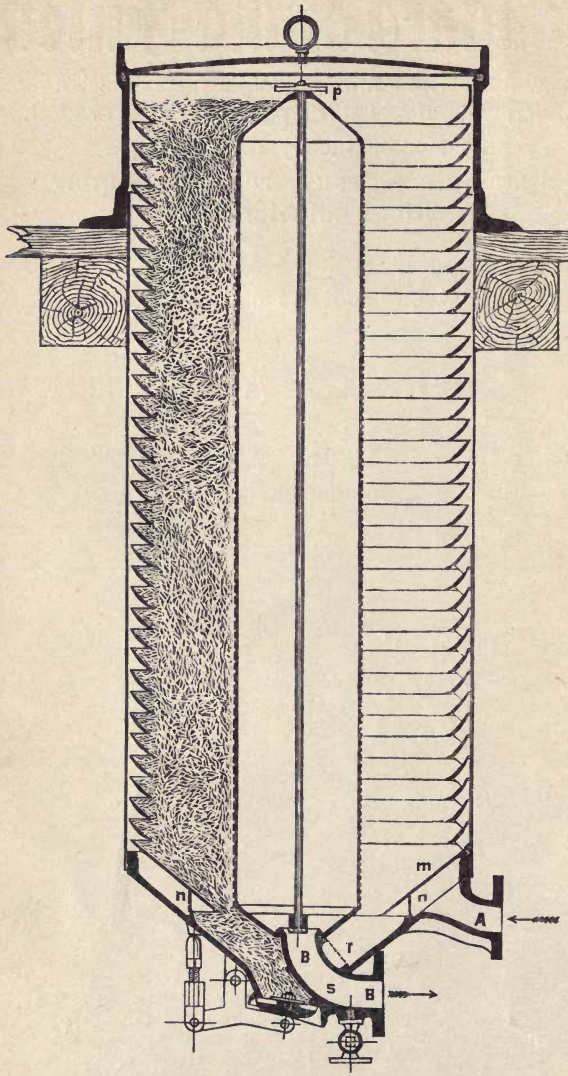
Address for Correspondence: "GEO. STADE, BERLIN: (B. P. A.) C. 2."

Registered Cable Address: **"Geostades Berlin".**

Code used: A. B. C., 4th Edition.

THE STANDARD-SAND-FILTER.

SCALE ABOUT 1:15.



2150 mm / 84 1/2"

430 mm / 17 1/2"

1435 mm / 56 1/2"

720 mm / 28 1/4" engl.

GEO. STADE

(VORM. GEO. STADE & Co.)

BERLIN: (B. P. A.) - C. 2.

Introductory Remarks: —

Ever since the introduction of thorough clarification into the industry, filtration by means of mechanical media has been found to be of the highest importance. As the consumption of coal and the savety of the boiler-house are most imporlent items in factories a thorough clarification of the feed-water etc. has been found out to be of considerable importance with regard to economy and savety.

The mechanical filters more or less in use in factories, chemical works, or for water clarification are very numerous, and quantities of patents have been taken out and often dropped again.

Without claiming to give a complete list, the constructions in practical use may be classed as follows:—

(A.) Those in which tissue of some kind or other is used. Among these may be mentioned:—

1. The old historical Taylor filter; working with long vertically arranged bags.
2. The Puvrez filter, in which the bags are placed horizontally in a gutter or trough.
3. The Pocket (and similar) filter; *e. g.*, those of the types Danèk, Kasalowsky, Scheibler, Excelsior, Claritas, Proksch, v. Ehrenstein, Müller, Philippe, Poulle, Bontemps and Rousseau, Feuillebois, Bride and Lachaume, Audonnet, and other systems.

(B.) Those in which other substances are used, with or without cloths.

1. Filter Presses working with xyloconchilith (Soxhlet's patent), charcoal dust, sawdust, kieselguhr, glass-wool, bagasse-dust, &c., &c.
2. Filters working with bagasse, gravel, cinders, china, glass, &c., according to the old charcoal system, the solution to be filtered entering either by the top or the bottom with or without mechanical stirring apparatus.

All these different systems possess, more or less, certain drawbacks and disadvantages which are often felt in practical working.

The filters of class (A), working with tissues, are only effective when the cloth is very tight. If taken too open the result is practically a negative one; if too close they are liable to choke very soon, and have to be cleared very often. Moreover, the loss in filtering material as sugar etc. is sometimes considerable, as a thorough washing out is not always advisable. If, on the other hand the wash-water from the washing machine re-enters a sugar factory, acidity is often the result, *and particularly in tropical climates* the filter cloth becomes a nidus for injurious bacteria; for instance, it is almost impossible to destroy the "Leuconostoc". Besides this, the filtering cloth is expensive, the wear and tear as a rule—even with washing machines—very great, and constant attention and much labour are required to keep the filters in order, in changing and washing the cloths, etc.

In regard to the filters of the second class (B) it is clear that of the filter-presses working with filtering media, the existence of the same drawbacks may be assumed as certain. The filtering media such as xyloconchilith (a mixture of wood-pulp and kieselguhr) or charcoal dust, are also expensive as a rule.

Sand as filtering medium:

The bagasse filters are liable to choking on account of the small filtering surface, the same may be said of the gravel filters working in the old charcoal style; every now and then the top layer of the gravel has to be stirred up to allow the filtering solution to reach the lower layers.

There can be no doubt, however, that the **filtering qualities of sand are not surpassed by any other material** as regards cheapness, facility of manipulation and regeneration. This is a fact well known and made use of—not only for sugar solutions but also to a far larger extent for water-filtration, etc.,—where, imitating nature, an extensive filtering surface is established, as in the case of large water works, giving the best results as to clearness, and also from a bacteriologico-hygienic point of view.

Of course, for clarifying water or sugar solutions etc. in factories the largest possible filtering surface ought, for practical reasons, to be given in the most compact form, and the facilities for filling, emptying, and cleaning, are weighty details to be taken into consideration.

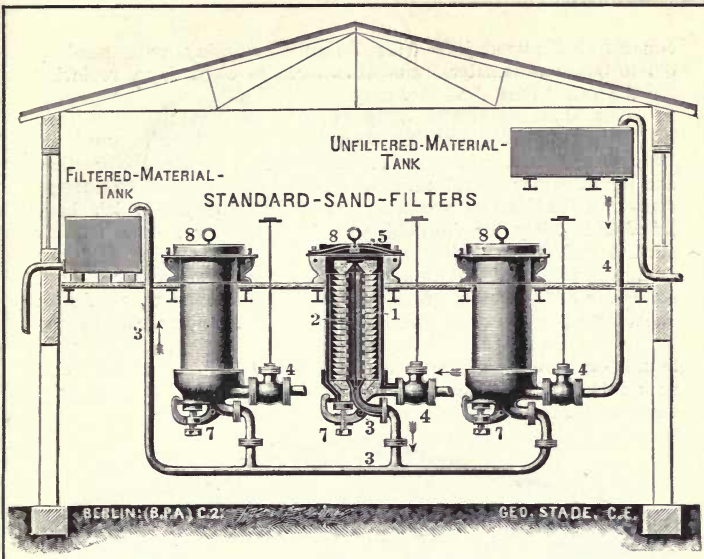
The new sand filter described below has the merit of combining the largest possible filtering surface with the smallest requirement of space. The advantages claimed for it, of absolute cleanliness and facility in handling, are evident, and the sparkling brightness of the filtered solutions is **not surpassed by any other system, not even charcoal.** The effect is extraordinary, even with the most cloudy solutions, as can be confirmed by personal testimony, many of the Standard Filters being already at work in factories, refineries, etc.

Description of Standard-Sand-Filters:

This filter consists of a cylinder with conical bottom.

In the centre of this cylinder is fixed a perforated pipe (2) of large diameter, also with a conical bottom, communicating with the delivery pipe (3). Between this outside cylinder and the perforated pipe (2) a system of conical rings (1) is arranged in such a manner that one ring stands on the top of the other, the system being completed by a large ring at the bottom. The seats of these rings touch the outside cylinder but leave sufficient space for the filtering substance to circulate. Sand of a special grain is put between the perforated pipe (2) and the cylinder, where it forms a natural slope (*i. e.,* filtering surface) between the rings. The solution to be filtered enters the filter through the pipe (4), fills the filter up to the air-cock (5), and passes (under the usual slight pressure) through the sand to the perforated pipe (2). The filtered solution issues by the delivery outlet (3). The size of the sand varies according to the liquid to be filtered. For water and thin juice a smaller grain is required than for syrup or refinery liquor. Under any circumstances the perforation of the central pipe is regulated accordingly, to prevent the sand from passing through.

As soon as the sand is saturated with impurities, water is admitted through pipe (4), to expel the remainder of the solution which is being filtered, if necessary. The outlet (7) below is then opened while the water is entering, and the sand escapes at once. Particular for tropical climates it is according to long experience with the filtration of cloudy liquids (sugar & water), of vital



importance that the filtering medium (the sand) is always thoroughly cleaned **outside** the filter. In this way eventually a strikt control can be exercised in order to prevent any germ to remain in the filter and in the sand. The emptying, cleaning and refilling operations are most simple and effective and take very little time. There is no filter in the market which can show the same facilities of manipulation. It can only be most strongly impressed upon not to have the sand regenerated in the filter as this is done in some cheap constructions. Who cares for pure water or sugar solution free of bacteria should not use those cheap filters. Besides, the trouble to clean the sand is a very small one and the expenses almost nil. The filter once empty and clean is at once ready for refilling. After washing the sand for *a few minutes with running water* or by means of an injector, the whole of the scum quickly separates and the sand is ready for again using in the wet state.

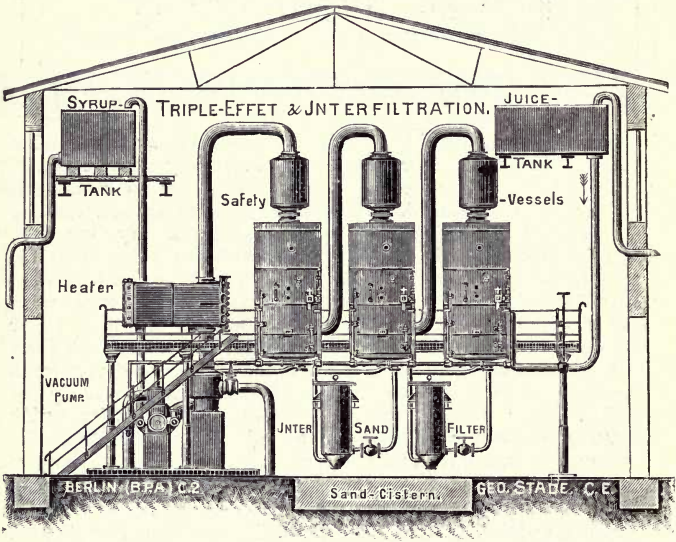
The Standard-Sand-Filters are in regular use this season for clearing raw-juice, cloudy liquors of the most gummy nature, concentrated syrups, feed-water and last not least raw-water.

For liquids containing coarse impurities, two filters are recommended; the first filter is filled with coarse sand taking up solid impurities in order to relieve the second filter.

The deposit of the scum in the Standard-Filter is found—not only on the external surface—but also throughout the *whole section* of the sand, as can be easily verified when a filter is opened for discharging. Of course the outside layers—where the sand forms a slope on the rings—contain a greater amount of deposit than the layers near the perforated pipe. Near the rings or plates (1) the sand accumulates about 10% of its weight in scum, while near the discharge-pipe (2) only 0,5% scum is found. The whole of the intermediate space between the sand-grains is utilised for the storage of scum. The action and reaction (due to the force of attraction) between the deposit and the sand-grains takes place through the whole layer of sand. This is the cause of the high efficiency of the Standard-Sand-Filter. One filter for

concentrated sugar juice, for instance, working with sand of 0·6 to 0·8 mm diameter, runs from three to eight days, replacing for the same time three ordinary pocket filters.

The Standard is **the only sand filter which has a free and unprotected and, therefore, most effective vertical filtering** surface and those manufacturers who desire a practical and faultless mechanical filtration should be careful **not to accept cheap substitutes working with strainers**—which have failed completely for thorough filtration. The free open filtering surface makes it possible to clarify the most concentrated and gummy liquids without difficulty with a minimum pressure — one meter (or 39") head is quite sufficient to work the filter. As the construction is a close and compact one, the filter can be put up in the piping as f. i. is done in filtering half concentrated liquids in evaporting systems (triple-effets or quadruple-effets with intermediate filtration), keeping the heating surface perfectly clean and effective.



It is only a short time since these filters were invented, and **already hundreds of them are at work.** The simplicity in construction, small wear and tear, efficiency in working, the doing away with any expensive filtering media such as cloths, and the obnoxious strainer on the entrance side etc.; the facility of manipulation and the quickness with which the sand is regenerated, combined with the limited requirements as to space, indicate that the Standard-Sand-Filters are likely to be appreciated by all manufacturers.

Extract of Certificates about the Standard-Sand-Filters:

SUGAR USINE SCZEDROWA working with the Ranson Process give the following opinion: 17. Nov. 98: —

„ . . . To filter the concentrated juice and also the syrups of „ the Ranson Process we have in constant use 6 Standard-Sand-

„ Filters which work as well as could be expected. They run
„ very long and give us an absolute guarantee for obtaining a
„ splendid mechanical filtration.

THE LABORATORY NASOWKA gives as the result of thorough experiments the following certificate:

„ . . . The Sand in the Standard-Filter remained in its position
„ during the whole time of filtration—4 days. The washing
„ out of the filter took about 30 minutes and there was no sugar
„ left in the discharged sand. Loss in sugar, therefore, such as
„ occurs with filter-cloths is entirely excluded.

THE ODESSA SUGAR REFINERY (Alexandrow Company) the largest Refinery in East Europe reports about the refinery work of the Standard-Filter—3. Dec. 98: —

„ The Standard-Sand-Filters run 2 to 3 days and work faultlessly.
„ The liquor is brilliant and free from all suspended matter, and
„ as these Filters are arranged in front of the charcoal filters the
„ economy in char is about 30% as they prevent the pores of
„ the char from being choked.

SUGAR WORKS TSCHUPACHOWKA write on the 21. Dec. 97:—

„ . . . the Standard-Sand-Filter which we put up last crop did
„ excellent service. The filtered syrup was much clearer and had
„ more fire than it could possibly be obtained through double
„ cotton cloth. Besides, we saved much labour and cloth. The
„ capacity of the Standard-Filter is enormous, as one filter
„ works off about 10 times as much syrup as one pocket filter
„ of the very best construction. Undoubtedly the Standard-Filters
„ do well not only for raw-juice and syrup but also for many
„ other purposes.

SUGAR FACTORY SCHPOLA gives the following testimonial, 12. Nov. 98: —

„ . . . we have worked this crop — along with a pocket-filter —
„ a Standard-Sand-Filter for concentrated juice. The filtered liquor
„ was exceedingly bright and far better than from the pocket-
„ filter. Taking into consideration the simplicity of the construction
„ and the easiness with which the Standard filters can be handled
„ and, furthermore, the doing away with all the expenses for filter-
„ cloth there cannot be the slightest doubt that the Standard-
„ Filter is superior to all other constructions. We can recommend
„ it sincerely to all factories.

SUGAR WORKS GORODOK 12. Nov. 98: —

„ The Standard-Sand-Filters run 3 to 5 days without trouble and
„ give even with the very thickest concentrated liquor an absolutely
„ clear product Considering the effect of filtration and the economy
„ in labour and the saving in cloth, we think them considerably
„ superior to any other construction.

SUGAR WORKS NOSOWSKA express themselves as follows, 14. Nov. 98: —

„ The Standard-Sand-Filters show beautiful results. Compared
„ with the pocket-filters the juice is as to brilliancy and colour far
„ superior even if the Standard-Filter is forced more than advisable.
„ We filter 4½ to 5 days, and up to the last hour the juice
„ remains very fine. The washing out, the discharging and the
„ refilling are very simple and the loss in sand nil as we have had the
„ same sand in use already for two months. All these advantages –
„ the great simplicity and the entire doing away with any filter-cloth—
„ make the Standard-Filter preferable to any other construction.

SCHEDROW SUGAR CO. LD: — 9. October 1899.
. . . The Standard-Sand-Filters work splendidly . . .

NOSOWO-KOSARSKAE Sugar Works: — 23. October 1899.
. . . The Standard-Sand-Filter does well, I will order two more shortly . . .

LEWASCHEWO-WRITOWETZKI SUGAR FACTORY: — 3. November 1899.
. . . I have to thank you for the work done by the Sand-Filters — from the very first day they proved such a succes that I shall do away with all my old pocket-filters.

COUNT W. A. BRANITZKI SUGAR WORKS: —
. . . three Standard-Filters serve us to filter the concentrated juice from 600 tons, each filter working 3 to 4 days. The juice is brilliant, the manipulation is very simple, and there is no chance of losses in sugar. As they pass the most concentrated liquor easily these filters are very valuable to our works.

OFFICE OF POTSCHAPINO: — 19. Nov. 1899.
. . . we are well satisfied, as the Filters give up to 1% more purity, running 4 days with brilliant liquor.

REFINERY KISKINSK: —
. . . we prefer your Sand-Filters to any other construction as they are simple and can be emptied quickly. The purity of the filtered liquor is always 0·5% higher than with pocket-filters . . .

List of Factories, Sugar Works & Refineries

which have adopted the Standard-Sand-Filters: —

Tschupachowka	Charkow	Schtschedrowo
Nowo-Tawolschansk	Wysche Oltschedajew	Weprik
Schamraewka	Suprupkowka	Kijanica
Odessa-Raffinerie	Tomaschpol	Timaschew
Illincy	Sosnowka	Rshewka
Wojtowcy	Spiritus-Monopol	Talmoje
Potschapincy	Stepanowka	Gorodok
Smiela	Ertil	Sumsko-Stepanowka
Schpanow	Sumy	Schpola
Balakleja	Berditschew	Blahodatmoje
Malowiski	Korukowka	Kissling
Sinjawa	Danilow	Lubimowka
Marino-Raffinerie	Nosowka	Saliwonki

Numerous Orders for Factories in

United States Colonies	Hawaiian Islands
English Colonies	Mexico
Mauritius	Argentina
East Indies	South East Africa
United States	etc. etc.

47 Standard Sand Filters sold last crop within 3 month
— to all parts of the world. —

Prices for general Standard-Sand-Filter Arrangements.

1	Code words (beginnings)		Gun	Gur	Gus	Gut	Gym	Gyr	Gul	Gum	Guid	Gold	—	Code words (endings)
2	Capacity of Factory in tons Raw mater. p. 24 hours		100	200	300	400	500	600	700	800	900	1000	—	—
3	Clarified juice filtration or thin liquids	£	120	120	240	240	360	360	480	480	600	600		shot
		$ gold	586	586	1072	1072	1758	1758	2344	2344	2928	2928	—	
		metr. tons	0·8	0·8	1·6	1·6	2·4	2·4	3·2	3·2	4·0	4·0		
4	Concentrated juice filtration or heavy chemical liquids	£	120	120	240	240	360	360	480	480	600	600		nard
		$ gold	586	586	1072	1070	1758	1758	2344	2344	2928	2928	—	
		metr. tons	0·8	0·8	1·6	1·6	2·4	2·4	3·2	3·2	4·0	4·0		
5	Syrup filtration or sticky liquids	£	120	120	120	120	240	240	240	240	360	360	360	set
		$ gold	586	586	586	586	1072	1072	1072	1072	1072	1072	1072	
		metr. tons	0·8	0·8	0·8	0·8	1·6	1·6	1·6	1·6	2·4	2·4	2·4	
6	Feed water filtration	£	120	120	120	120	240	240	240	240	360	360		tural
		$ gold	586	567	586	586	1072	1072	1072	1072	1072	1072	—	
		metr. tons	0·8	0·8	0·8	0·8	1·6	1·6	1·6	1·6	2·4	2·4		
7	25 tons raw sugar for Refining	£	—	—	—	—	—	—	—	—	—	—	120	Banscle
		$ gold	—	—	—	—	—	—	—	—	—	—	586	
		metr. tons	—	—	—		—	—	—	—	—	—	0·8	
8	100 tons Raw Water	£	—	—	—	—	—	—	—	—	—	—	120	Bune
		$ gold	—	—	—	—	—	—	—	—	—	—	586	
		metr. tons	—	—	—	—	—	—	—	—	—	—	0·8	

All prices include the necessary fittings, (but no connections and not sand) packing and delivery f. o. b.
Filter Sand supplied at a rate of £ 2:10: — $ 12.20 per metr. ton f. o. b., bags included.
Quotations are subject to the fluctuations of the market.

Terms:—Half on ordering, balance on delivery or special terms.

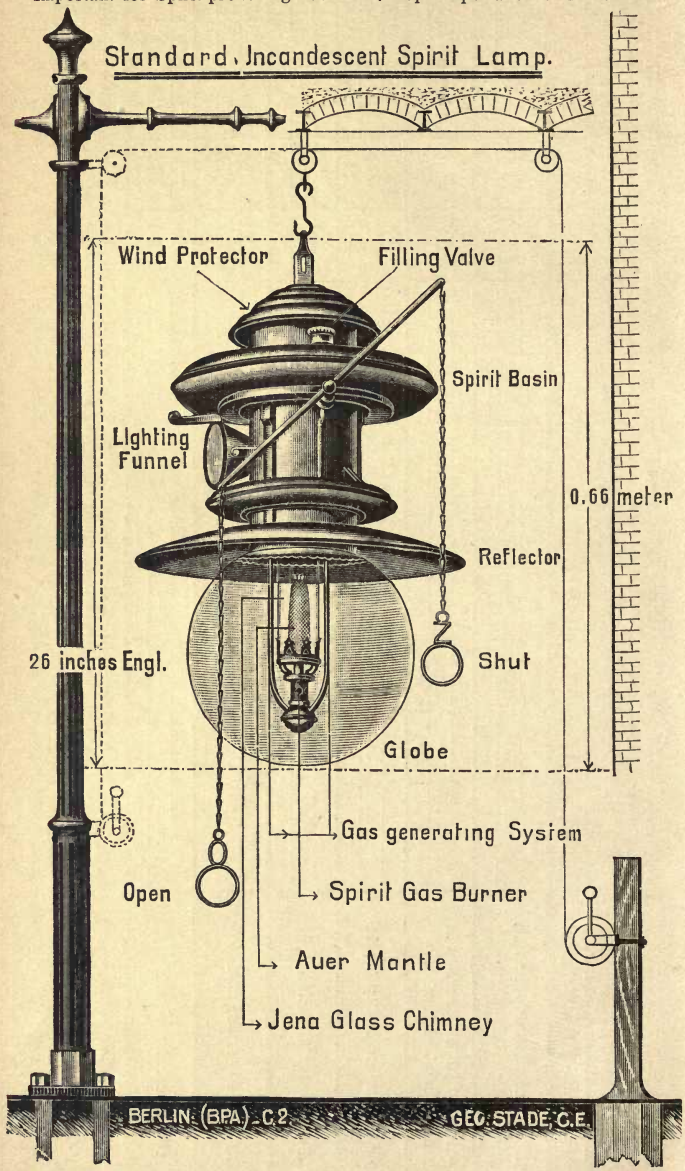
BERLIN: (B. P. A.) - C. 2.

GEO. STADE.

Geo. Stade, Civil-Engineer, Berlin: (B. P. A.) - C. 2.

The Standard Incandescent Spirit Lamp.

MOST BRILLIANT and SAFEST LIGHT for FACTORIES, RAILWAYS, YARDS, STREETS, HOUSES.
Great Economy: 1-10th litre of Spirit per hour, 70-100 candles.
Important for Spirit-producing countries: stops importation of Petroleum.



Fully reliable; burns 24 hours; in connection with Electric Light, saves expensive Accumulators; very simple in construction; needs no attendance; over 10,000 used on the Prussian State Railway alone!
PRICE, £ 7 or dollars (gold) 34 inclusive spares for 12 months, packed and delivered f. o. b.

Filtro de Arena Standard.

Filtracion Mecanica.

For GEO. STADE, BERLIN, C. 2.

Desde la introducción en la industria azucarera de la clarificación completa, la filtración por medias mecánicas ha sido considerada de la mayor importancia. Cuando se clarificaba el guarapo á baja temperatura, y el uso de la cal y ácido sufúrico estaba muy limitado é ininteligible, la filtración con carbón estaba considerada como el único medio efectivo de recomponer los errores cometidos al principio. En las fábricas de caña como también en las de remolacha y en las refinerias, se usó el negro animal en grandes cantidades. Algunas veces se ha empleado más de 100 toneladas de carbón para 100 toneladas de azúcar y naturalmente los gastos fueron encontrados proporcionalmente elevados.

El progreso hecho en la clarificación y la necesidad absoluta en vista de los precios declinados á reducir los gastos, pronto se vió donde se debian hacer las mejoras. El efecto del carbón sobre los jugos, decolorización y absorción de sales, se pudo obtener también con completa clarificación bajo un tratamiento quimico regular y por filtración mecánica ordinaria.

Hay actualmente un cuarto de siglo desde que el Dr. G. F. Meyer, de Brunswick, demostró prácticamente que la remolacha de primera clase puede ser producida sin carbón y con la mayor economia.

Desde entonces todas las fábricas de azúcar han dejado el negro animal y también en las refinerias modernas su uso ha sido muy reducido, ó bien—permitiéndolo las circunstancias—en algunos casos ha sido abandonado completamente.

En consecuencia, la necesidad de una filtración completa mecánica es de vital importancia para un buen trabajo; primero, respecto á la calidad del azúcar, y segundo por la eficiencia del aparato de evaporación. El trabajo del filtro mecánico es el de limpiar las soluciones azucaradas.

Primero. En su estado crudo ó di suelto, para prevenir ciertas descom posiciones quimicas causadas por la acción de la cal sobre ciertas impurezas como por ejemplo, arabina, ó para conservar las impurezas suspendidas de entrar en las clarificaciones ó los evaporadores y así prevenir toda incrustación.

Segundo. Para separar las impurezas particularmente las sales de la cal silicate, etc., que se suspendan en el estado de semi-concentración del jugo (entre el primero y el último evaporador) como para también prevenir incrustación.

Tercero. Para eliminar las partidas suspendidas del jugo concentrado sirope ó licor para mejorar la calidad del azúcar aún sea bruto, granulado ó refinado.

Los filtros mecánicos más ó menos usados en los ingenios de azúcar, fábricas de drogas ó por la clarificaciön del agua son muy numerosos, y cantidades de patentes han sido pedidos y muchas veces dejados.

Sin querer dar una lista completa de las construcciones en actual uso pueden ser clasificadas como siguen:

(A) Los en que se usen género de manta. Entre ellos podemos mencionar:

1. El filtro viejo histórico de Taylor. Trabajando con sacos arreglados verticalmente.

2. El filtro Puvrez en el cual se encuentra los sacos puestos horizontalmente.

3. El filtro de bolsa (o similares) e. g., que son los del tipo Danek, Kasalowsky, Scheibler, Claritas, Proksch, V. Rousseau, Ehrenstein, Muller, Phillippe, Poulle, Bontemps, Feuillebois, Bride y Lachaume, Audonnet y otros sistemas.

(B) Los en que se usan otras substancias con ó sin manta:

1. Filtro prensas trabajando con xyloconchilith (Patente Soxhlet) carbón de leña, aserrín, kieselguhr, bagazo, etc.

2. Filtros trabajando con bagazo, arena, cenizas, cristal, etc., según el viejo sistema de carbón de leña, la solución para ser filtrado entrando en la máquina por arriba ó por abajo.

Todos estos diferentes sistemas poseen mas ó menos sus desventajas que muchas veces aparecen en el trabajo práctico.

Los filtros de la clase (A) trabajan do con manta sólo son efectivos cuan do la manta está bien restirada. Si se dejan demasiado abiertos el resultado es prácticamente nulo. Si están demasiado juntos son capaces de cerrarse completamente, necesitando limpiarse frecuentemente. Además, la pérdida de azúcar es considerable algunas veces, como una limpieza completa no es siempre conveniente. Si se deja entrar la agua de la máquina de limpiar en la fábrica, resulta muchas veces acididad, y particularmente en países tropicales porque la manta del filtro llega á ser un nido de bacteria injuriosa; por ejemplo, la destrucción del "Leuconostoc" es ca si imposible. Además de esto la manta para los filtros es costosa. El uso aunque es muy fuerte se requiere mucha atención y trabajo para conservar los filtros en buen estado, cambiando y limpiando la manta, etc.

Referente á los filtros de segunda clase (B) es claro que los filtros-prensas trabajando con medios otros que no sea la manta, las existencias de las mismas desventajas pueden ser asumidas como ciertas. El medio para filtrar tal como xyloconchilith (una mezcla de pulpa de madera y kieselguhr) ó carbón de leña son también costosas en regla general.

Los filtros con bagazo corren el peligro de cerrarse, debido á la pequeña superficie de filtración, lo mismo se puede dezir de los filtros con arena trabajando con el viejo sistema de carbón

de leña. De vez en cuando hay de mover la capa de encima de la arena para permitir á la solución para filtrar de llegar á las capas inferiores.

No hay duda, sin embargo, que las calidades de filtración de la arena no puede ser mejorada por cualquier otro material, por su baratura y facilidad de manipulación y regeneración. Esto es un hecho bien conocido y usado, no solamente para soluciones de Azúcar; pero mucho más todavía para la filtración de Agua, etc., á donde imitando la naturaleza se establece una superficie extensa, como en el caso de grandes depósitos de agua, dando los mejores resultados, como también el punto de vista bacteriológo-higiénico.

Naturalmente para clarificar agua de beber ó soluciones de azúar en fàbricas, debe procuarse por rizones prácticas la superficie más grande posible en la forma la más compacta y con facilidades para llenar y vaciar; estos detalles deben ser tomados en consideración como muy importantes.

El nuevo filtro con arena representado en seguida, tiene el mérito de combinar la superficie más grande posible con el más pequeño espacio ocupado. Las ventajas que tiene de absoluta limpieza, facilidad de manejo son evidentes, y la brillantez de las soluciones no puede ser mejorado con ningún otro sistema, ni aún con la leña.

En efecto, es extraordinario aun con las soluciones más sucias como puede ser confirmado por testimonios personales, muchos de los Filtros Standard están ya en uso en fábricas, refinerías, etc. Este filtro consiste de un cilindro con fondo cónico.

En el centro de este cilindro está fijado un tobo perforado (2) de gran diámetro, también con un fondo cónico comunicando con el tubo de entrega (3). Entre este cilindro exterior y el tubo, perforado (2), un sistema de anillos cónicos (1) está arreglada de tal manera que un anillo se encuentra encima de otra, el sistema siendo completado con un gran anillo al fondo. Los asientos de estos anillos tocan el cilindro exterior, pero dejan espacio suficiente para que circule la substancia para filtrar. Arena de grano especial se pone entre el tubo perforado (2) y el cilindro á donde hace una inclinación natural (i. e. superficie de filtración) entre los anillos. La solución para ser filtrada entra en el filtro por el tubo (4), llena el filtro hasta la llave de aire (5) y pasa (bajo la presión usual ligera) á través de la arena hasta el tubo perforado (2).

La solución filtrada sale por la salida (3). La arena tiene que ser preparada antes de usarla, y el tamaño de los granos varía según el liquido que haya de filtrarse. Para agua y jugo delgado se necesita un grano más pequeño que para sirope ó licor de refinería. Bajo todas circunstancias, la perforación del

tubo central está arreglada según la arena empleada para que no pase á través.

Tan luego como la arena está saturada con impurezas se admite agua por el tubo (4) para echar la que queda de la solución que está filtrándose si es necesario. La salida (7) se abre mientras que entra el agua y la arena se va en seguida. Ahora el filtro se encuentra vacío y limpio, listo para rellenar. Después de haber limpiado la arena durante algunos minutos con agua ó por medio de un inyectador, toda la impureza se separa, y la arena está lista para emplearse de nuevo en su estado húmedo.

Los filtros de arena Standard están en uso regular hasta un año para limpiar jugos brutos, licores sucios de calidad muy gomosa, siropes concentrados y agua de beber.

Para jugo bruto y licores conteniendo impurezas fuertes se recomienda dos filtros, el primero se llena con arena muy gruesa que lleva la mayor parte de las impurezas, aliviando al segundo filtro.

El depósito de la espuma en el filtro Standard se encuentra—no solamente sobre la superficie exterior—pero también en toda la sección de la arena, como se puede verificar muy bien cuando el filtro está abierto para su descarga. Naturalmente las capas exteriores—adonde la arena se encuentra al rededor de los anillos—contiene más depósito que las capas cerca del tubo perforado. Todo el espacio intermediario entre la arena se utiliza para la espuma. La acción y reacción (debido á la fuerza de atracción) entre el depósito y la arena sucede á través de toda la capa de arena. Esta es la causa de la alta eficiencia del Filtro de Arena Standard. Un Filtro para jugo concentrado trabajando con arena de 0,6 á 0,8 mm diámetro es ámpliamente suficiente para trabaja 200 toneladas de materia bruta y trabaja de tres á ocho días reemplazando en el mismo tiempo tres filtros ordinarios de bolsas. Para refinerías trabajando con filtros de carbón, se ha demostrado que un filtro Standard arreglado en frente del filtro de carbón ahorra treinta por ciento de carbón, impidiendo que los poros del carbón se llenen con la materia mecánica suspendida.

Hace poco tiempo que estos filtros han sido inventados, y ya hay varias centenas en uso. La simplicidad de la construcción y eficiencia del trabajo, y ahorrando gastos de manta, etc., la facilidad de manipulación y prontitud con la cual la arena se regenera combinada con las pequeñas necesidades de espacio, indican que el Filtro Standard será apreciado por todor los fabricantes de Azúcar, sobre todo siendo el precio tan moderado.

Intermediate Filtration

applied to: —

Triple-Effet-Juice &c.

as the only economical medium preventing troublesome steam-consuming and dangerous incrustations of heating tubes &c.

if carried into effect

with the

STANDARD-SAND-FILTER.

With prices & certificates & references.

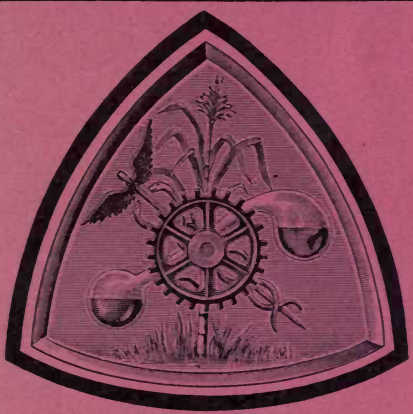
GEO. STADE,

Civil-Engineer & Technical Chemist,

Expert in Sugar & Spirit Manufacture & Refining,

Formerly Officer of the Imperial Patent Office (Berlin); Correspondent of all leading Sugar Journals; Technical Adviser and Director of Sugar Works, Distilleries, and Experimental Stations.

Memb. Assoc. G. Engineers; Fellow G. Chemical Society; Memb. Union Sugar Technologists.



Technical Departments for Sugar Works & Distilleries etc.
(Established 1888-formerly Geo. Stade & Co.): —

I: Cane & Beet Sugar Machinery.	IV: Laboratories-Instrum.-Analyses.
II: Rum Distilleries-Spirit Refineries.	V: Reports-Consultations-Patents.
III: Stores-Fittings-Implements.	VI: Representations-Agencies.

Bankers: "Deutsche Bank" Berlin (& London).

Address for Correspondence: "GEO. STADE. BERLIN: (B. P. A.) — C. 2."

Registered Cable Address: **"Geostades Berlin".**

Code used: A. B. C., 4th Edition.

Introductory Remarks: —

Since the adoption of the system of evaporating and granulating in vacuo sugar and other solutions, the obnoxious incrustations depositing on the heating surface of the evaporating vessels &c have been a considerable cause of trouble on account of their seriously diminishing the working capacity of the evaporator. The composition of these deposits varies largely, according to the quality of the liquid evaporated and the lime and chemicals applied in the clarifying operations. In the case of beet-juice, for instance, the deposits found in a triple-effet had the following composition: —

	In the tubes Percent	On the side wall Percent
Silicates	76·75	73·52
Alumina & Iron	4·54	2·92
Lime Salts	7·71	4·94
Magnesia	traces	0·25
Organic matter	10·31	17·30

In a West India cane-sugar factory, using sulphurous acid freely, the figures below were found: —

	third body, triple-effet Percent	Coil of vacum-pan Percent
Silicates	9·13	0·32
Alumina & Iron	1·55	3·15
Sulphate of lime	66·32	57·83
Organic matter	23·00	38·70

For a cane-factory working with quadruple-effet and phosphoric acid clarification the following analysis is given: —

	First body	Second body	Third body	Furth body
Water	18·06	17·47	19·88	21·23 %
Organic matter	20·40	17·98	14·76	13·08 %
Chlorate of Potash ..	0·47	0·40	0·53	0·60 %
Silicates	2·47	1·54	1·26	10·78 %
Alumina & Iron	1·60	2·68	1·35	1·98 %
Carbonate of lime ..	3·49	5·10	4·98	2·73 %
Sulphate of lime ..	4·54	6·59	8·20	14·37 %
Phosphate of lime ..	40·86	43·32	44·87	31·22 %
Phosphate of Magnesia	6·09	1·81	0·20	0·02 %

However much the analysis of the deposits may vary, under any circumstances they influence and affect more or less sensibly the quantity and also the quality of the work done by a boiling-pan. *The longer the boiling lasts the more liable are sugar solutions to decompose,* and on the other hand it is astonishing how *the slightest incrustation at once diminishes the working capacity of any evaporator. The rapidity of evaporation is always chiefly depentent on the caloric transmission capability of the heating surface,* and this is only too well appreciated by practical sugar-manufacturers when they are forced to slack down at the end of the week. Now while the most energetic measures are adopted to remove or diminish boiler-incrustations, numberless chemicals &c are applied, filters and deposit-tanks &c are used &c, the possibility of the prevention of boiling-pan incrustation has up to now been more or less disregarded.

Drawbacks of old style work: —

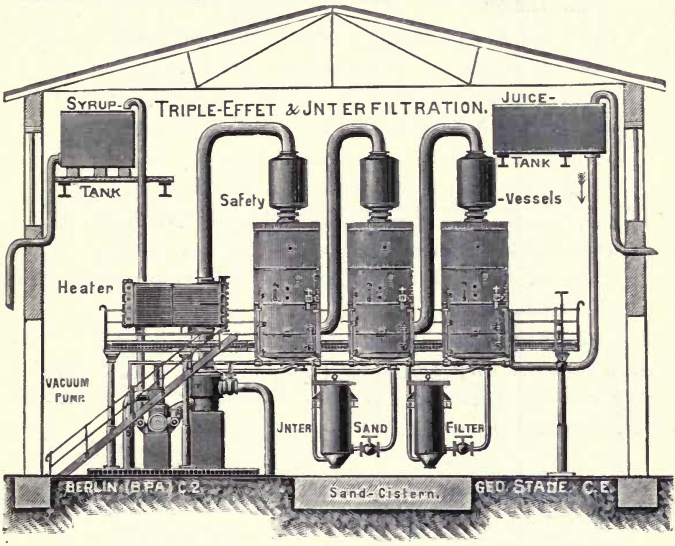
In order to avoid the consequences of the incrustations — i.e. diminished work—large and expensive heating plants are installed as a rule, or, in some cases, a spare body is put up. But mostly the manufacturers are quite satisfied with getting their tubes clean again by a regular heavy boiling out with acids and caustic soda or by a thorough scraping. The expense of these operations in labour, chemicals, and fuel, and the wear & tear in connection with it are considered as drawbacks which cannot be avoided. Nevertheless it was positively proved many years ago by the well known sugar expert, Dr. Stammer, and others, that *by means of intermediate filtration the heating surfaces of a triple-effet can be kept almost perfectly clean and effective.* Charcoal was first used in the old style filters to clean the semi-concentrated juice passing from one body to the other. Afterwards wooden shavings or wood pulp in connection with filter-cloths were used as filtering mediums. But though the effect of this intermediate filtration is remarkable, it has not come into general use for practical reasons. First of all, filter-presses are badly qualified for this purpose, as the many joints often seriously affect the vacuum, giving too much trouble to get them hermetically closed. Furthermore the old charcoal and wood pulp filters provided too small a surface to be a success in the long run. Lastly the filters working with sand-filling and cloth-strainers also require refilling rather often. In spite of this, however, they do good service, as the fundamental idea is a capital one. This is the reason why the factories working with these old sand-filters rather put up with the drawbacks of these old system than have their heating-surfaces made less effective.

The Standard as intermediate Filter: —

However, by the introduction of the new Standard-Sand-Filter all the former drawbacks are overcome. This filter has only very few joints, it can be emptied and refilled in less than half an hour, if necessary. It has a perfectly open, large, vertical filtering surface, consequently *no choking of cloth or strainers is possible, this is the reason that it can run as many days as the other filters run hours.* With this Standard-Filter the proper quality of sand can be used that is required for this special purpose of intermediate filtration, in order to do away with the suspended matter at the outset (in statu nascendi). It is evident that the larger the grain of the sand the less the filter will be liable to stop working, but the effect will, of course, be nil if too large grain is used. On the other hand,

it is clear that with fine sand all incrustations in suspenso would be easily and completely eliminated, but the filtering surface would also become closed up very quickly, allowing no more liquid to pass and the refilling would have to be done more frequently than is praticable. By long experience it has now been found out that for this intermediate filtration a grain of about 0·7 millimeters is small enough to absorb all the deposits in suspense—without the open outer filtering surface becoming choked. As the Standard-Sand-Filter, on account of its remarkably open surface requires a working pressure of 1000 millimeters only, it is furthermore evident that the difference in vacuum between the evaporating vessels — even in a quintuple effet — is amply sufficient to keep the intermediate filtration going without the slightest trouble.

Modern intermediate Filtration: —



The above cut shows now the pratical arrangement of the Standard-Sand-Filter as indermediate filter with a Triple-Effet. The two filters are arranged here underneath the evaporating bodies behind, but they may of course, if convenient, be placed at any reasonable distance or height away from the evaporators. The washing of the sand can also be done anywhere, the filling operation causes no dust and is finished in a few minutes. For factories working up to about 500 tons of cane, one filter is required between two bodies, for larger works, up to the greatest dimensions, two filters supply ample filtering surface. They run for a long time without requiring the sand to be changed.

Advantages of the Standard-Filter as intermediate Filter: —

To sum up, the advantages of the intermediate filtration are:—

1. Saving in labour, &c, in doing away with the scraping of the thousands of tubes every week.
2. Saving in chemicals, acid, caustic soda, &c.
3. Economy in steam, &c. As a rule some of the boilers have to be kept going for the boiling and washing out operation.
4. Important saving in wear & tear as the boiling and scraping quickly ruins tubes, shell, and fittings.
5. No more accidents with labourers burning themselves by handling the chemicals carelessly, no more bursting of bottoms eaten away by the chemicals.
6. The quality of the sugar improves, as quick work means less caramelization.
7. The volume of the sugar losses, particular the unaccountable losses decreases, as it is generally recognised now that most of these losses originate by keeping the syrups too long in contact with heating surfaces at a high temperateure.
8. General increase of the working capacity of the works, eventually saving outlay for new machinery.
9. Last and not least, the regular working of the factory for the whole week, no more stoppages on account of slow evaporation at the end of the week, consequently economy in labour and fuel.

The filters can be connected with and ought to be arranged in any evaporating system in such a way that they can be disconnected at any moment without interfering with the general work of the factory.

I. Prices of Sand-Filter-Arrangements

for

Intermediate Filtration.

1	Code words (beginnings)		Bur	Bust	But	Bux	Code words (endings)
2	**Evaporation system at work: —**		Double Effet	Triple Effet	Quadruple Effet	Quintuple Effet	
3	**Capacity of Factory** — under 500 tons — Raw Material in 24 hours	£	120	240	360	480	ling
		$ gold	586	1072	1758	2344	
		metr. tons	0·8	1·6	2·4	3·2	
4	**Capacity of Factory** — over 500 tons — Raw Material in 24 hours	£	240	480	720	960	ment
		$ gold	1072	2144	3516	4688	
		metr. tons	1·6	3·2	4·8	6·4	

All prices include the necessary fittings, (but no connections and not sand) packing and delivery f. o. b.

Filter Sand supplied at a rate of £ 2:10: — $ 12.20 per metr. ton f. o. b. bags included.

Quotations are subject to the fluctuations of the market.

Terms:—Half on ordering, balance on delivery or special terms.

BERLIN: (B. P. A.) - C. 2.

GEO. STADE.

Geo. Stade, Civil-Engineer, **Berlin: (B. P. A.) - C. 2.**

The Standard Sand Filter.

Ever since the introduction of thorough clarification into the sugar industry, filtration by means of mechanical media has been found to be of the highest importance. When the raw juice was clarified at low temperatures, and the use of lime and sulphurous acid was very limited and unintelligent, filtration over charcoal was considered to be the only effective way of repairing the errors committed at the outset. In cane, as well as beet factories, and last (and not least) in refineries, bone-black was used to a large exent. Sometimes over 100 tons of char were used to 100 tons of sugar, and, of course, the expenses were found to be commensurate.

The progress made in clarification, and the absolute necessity, in face of declining prices, of reducing working expenses, soon pointed out the lines on which the improvements had to be directed. The effect the charcoal on the juice—*i. e.,* decolorisation and absorption of salts—was found out to be attainable also by thorough clarification under regular chemical supervision and by simple mechanical filtration.

It is now a quarter of a century since Dr. G. F. Meyer, of Brunswick, practically demonstrated that first-class sugar could be produced without charcoal and with the greatest economy.

Since then all modern raw sugar factories have done away with bone-black, and even in modern refineries the use of it has very much been reduced or—circumstances permitting—has in many cases been abolished altogether.

Consequently the necessity of a thorough mechanical filtration has become of vital importance for successful working, firstly, as regards the quality of the sugar, and secondly, for the efficiency of the evaporating apparatus. The work of the mechanical filter is to cleanse the sugar solutions:—

(Firstly) in the raw or diluted state, to prevent certain chemical decompositions caused by the action of lime on some impurities, such as arabine, or to keep the suspended impurities from entering the clarifiers or the evaporators and thus to prevent incrustation.

(Secondly) to separate the impurities, particularly the lime salts, silicates, etc., which become suspended in the *semi-concentrated* stages of the juice (between the first and last vessel of the evaporators), also in order to prevent incrustation.

(Thirdly) to eliminate the suspended portions of the *concentrated* juice, syrup or liquor, in order to improve the quality of the sugar, wheter raw, granulated, or refined.

The mechanical filters more or less in use in sugar factories, chemical works, or for water clarification are very numerous, and quantities of patents have been taken out and often dropped again.

Drawbacks of old style filters:

Without claiming to give a complete list, the constructions in practical use may be classed as follows:—

(A.) Those in which tissue of some kind or other is used. Among these may be mentioned:—

1. The old historical Taylor filter; working with long vertically arranged bags.
2. The Puvrez filter, in which the bags are placed horizontally in a gutter or trough.
3. The Pocket (and similar) filter; *e.g.,* those of the types Danèk, Kasalowsky, Scheibler, Excelsior, Claritas, Proksch, v. Ehrenstein, Müller, Philippe, Poulle, Bontemps and Rousseau, Feuillebois, Bride and Lachaume, Audonnet and other systems.

(B.) Those in which other substances are used, with or without cloths.

1. Filter Presses working with xyloconchilith (Soxhlet's patent), charcoal dust, sawdust, kieselguhr, glass-wool, bagasse-dust, &c., &c.
2. Filters working with bagasse, gravel, cinders, china, glass, &c., according to the old charcoal system, the solution to be filtered entering either by the top or the bottom.

All these different systems possess, more or less, certain drawbacks and disadvantages which are often felt in practical working.

The filters of class (A), working with tissues, are only effective when the cloth is very tight. If taken too open the result is practically a negative one; if too close they are liable to choke very soon, and have to be cleared very often. Moreover, the loss in sugar is sometimes considerable, as a thorough washing out is not always advisable. If, on the other hand the wash-water from the washing machine re-enters the factory, acidity is often the result, *and particularly in tropical climates* the filter cloth becomes a nidus for injurious bacteria; for instance, it is almost impossible to destroy the "Leuconostoc". Besides this, the filtering cloth is expensive, the wear and tear as a rule—even with washing machines—very great, and constant attention and much labour are required to keep the filters in order, in changing and washing the cloths, etc.

In regard to the filters of the second class (B) it is clear that of the filter-presses working with filtering media other than cloth, the existence of the same drawbacks may be assumed as certain. The filtering media such as xyloconchilith (a mixture of wood-pulp and kieselguhr) or charcoal dust, are also expensive as a rule.

Sand as filtering medium:

The bagasse filters are liable to choking on account of the small filtering surface, the same may be said of the gravel filters working in the old charcoal style; every now and then the top layer of the gravel has to be stirred up to allow the filtering solution to reach the lower layers.

There can be no doubt, however, that the filtering qualities of sand are not surpassed by any other material as regards cheapness, facility of manipulation and regeneration. This is a fact well known and made use of—not only for sugar solutions but also to a far larger extent for water-filtration, etc.,—where, imitating nature, an extensive filtering surface is established, as in the case of large water works, giving the best results as to clearness, and also from a bacteriologico-hygienic point of view.

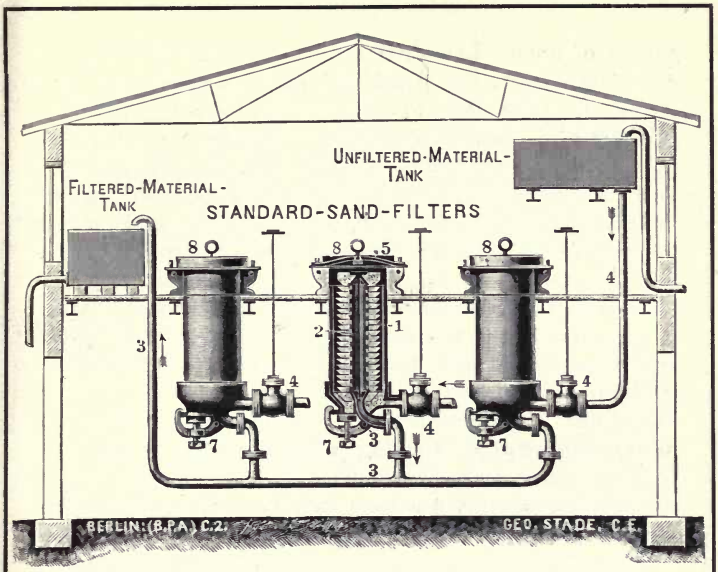
Of course, for clarifying feed-water or sugar solutions etc. in factories the largest possible filtering surface ought, for practical reasons, to be given in the most compact form, and the facilities for filling, emptying, and cleaning, are weighty details to be taken into consideration.

The new sand filter described below has the merit of combining the largest possible filtering surface with the smallest requirement of space. The advantages claimed for it, of absolute cleanliness and facility in handling, are evident, and the sparkling brightness of the filtered solutions is **not surpassed by any other system,** not even charcoal. The effect is extraordinary, even with the most cloudy solutions, as can be confirmed by personal testimony, many of the Standard Filters being already at work in factories, refineries, etc.

Description of Standard-Sand-Filters:

This filter consists of a cylinder with conical bottom.

In the centre of this cylinder is fixed a perforated pipe (2) of large diameter, also with a conical bottom, communicating with the delivery pipe (3). Between this outside cylinder and the perforated pipe (2) a system of conical rings (1) is arranged in such a manner that one ring stands on the top of the other, the system being completed by a large ring at the bottom. The seats of these rings touch the outside cylinder but leave sufficient space for the filtering substance to circulate. Sand of a special grain is put between the perforated pipe (2) and the cylinder, where it forms a natural slope (*i. e.,* filtering surface) between the rings. The solution to be filtered enters the filter through the pipe (4), fills the filter up to the air-cock (5), and passes (under the usual slight pressure) through the sand to the perforated



pipe (2). The filtered solution issues by the delivery outlet (3). The sand has to be prepared before using, and the size of the grain varies according to the liquid to be filtered. For water and thin juice a smaller grain is required than for syrup or refinery liquor. Under any circumstances the perforation of the central pipe is regulated accordingly, to prevent the sand from passing through.

As soon as the sand is saturated with impurities, water is admitted through pipe (4), to expel the remainder of the solution which is being filtered, if necessary. The outlet (7) below is then opened while the water is entering, and the sand escapes at once. The filter is now empty and clean again, ready for refilling. After washing the sand for *a few minutes with running water* or by means of an injector, the whole of the scum quickly separates and the sand is ready for again using in the wet state.

The Standard-Sand-Filters are in regular use this season for clearing raw-juice, cloudy liquors of the most gummy nature, concentrated syrups, and feed water.

For raw-juice, or for refining liquor containing coarse impurities, two filters are recommended; the first filter is filled with coarse sand taking up solid impurities in order to relieve the second filter.

The deposit of the scum in the Standard-Filter is found—not only on the external surface—but also throughout the *whole section* of the sand, as can be easily verified when a filter is opened for discharging. Of course the outside layers—where the sand forms a slope on the rings—contain a greater amount of deposit than the layers near the perforated pipe. The whole of the intermediate space between the sand-grains is utilised for the

storage of scum. The action and reaction (due to the force of attraction) between the deposit and the sand-grains takes place through the whole layer of sand. This is the cause of the high efficiency of the Standard-Sand-Filter. One filter for concentrated juice, working with sand of 0·6 to 0·8 mm. diameter, runs from three to eight days, replacing for the same time three ordinary pocket filters. For refineries working with charcoal filtration it has been found that a Standard-Filter arranged in front of the char filter *saves 30 per cent. of charcoal,* by preventing the pores of the char from being choked with mechanically suspended matter.

The Standard is **the only sand filter which has a free and unprotected and, therefore, most effective vertical filtering** surface and those manufacturers who desire a practical and faultless mechanical filtration should be careful **not to accept cheap substitutes working with strainers**—which have failed completely for sugar filtration.

It is only a short time since these filters were invented, and **already hundreds of them are at work.** The simplicity in construction, small wear and tear, efficiency in working, the doing away with any expensive filtering media such as cloths, and the obnoxious strainer on the entrance side etc.; the facility of manipulation and the quickness with which the sand is regenerated, combined with the limited requirements as to space, indicate that the Standard-Sand-Filters are likely to be appreciated by all sugar manufacturers and by many others.

Extract of Certificates about the Standard-Sand-Filters:

SUGAR USINE SCZEDROWA working with the Ranson Process give the following opinion: 17. Nov. 98: —
„ . . . To filter the concentrated juice and also the syrups of
„ the Ranson Process we have in constant use 6 Standard-Sand-
„ Filters which work as well as could be expected. They run very
„ long and give us an absolute guarantee for obtaining a
„ splendid mechanical filtration.

THE LABORATORY NASOWKA gives as the result of thorough experiments the following cerficate:
„ . . . The Sand in the Standard-Filter remained in its position
„ during the whole time of filtration—4 days. The washing
„ out of the filter took about 30 minutes and there was no sugar
„ left in the discharged sand. Loss in sugar, therefore, such as
„ occurs with filter-cloths is entirely excluded.

THE ODESSA SUGAR REFINERY (Alexandrow Company) the largest Refinery in East Europe reports about the refinery work of the Standard-Filter—3. Dec. 98: —
„ The Standard-Sand-Filters run 2 to 3 days and work faultlessly.
„ The liquor is brilliant and free from all suspended matter, and
„ as these Filters are arranged in front of the charcoal filters the
„ economy in char is about 30% as they prevent the pores of
„ the char from being choked.

SUGAR WORKS TSCHUPACHOWKA write on the 21. Dec. 97:—

„ . . . the Standard-Sand-Filter which we put up last crop did „ excellent service. The filtered syrup was much clearer and had „ more fire than it could possibly be obtained through double „ cotton cloth. Besides, we saved much labour and cloth. The „ capacity of the Standard-Filter is enormous, as one filter „ works off about 10 times as much syrup as one pocket filter „ of the very best construction. Undoubtedly the Standard-Filters „ do well not only for raw-juice and syrup but also for many „ other purposes.

SUGAR FACTORY SCHPOLA gives the following testimonial, 12. Nov. 98: —

„ . . . we have worked this crop — along with a pocket-filter — „ a Standard-Sand-Filter for concentrated juice. The filtered liquor „ was exceedingly bright and far better than from the pocket- „ filter. Taking into consideration the simplicity of the construction „ and the easiness with which the Standard filters can be handled „ and, furthermore, the doing away with all the expenses for filter- „ cloth there cannot be the slightest doubt that the Standard- „ Filter is superior to all other constructions. We can recommend „ it sincerely to all factories.

SUGAR WORKS GORODOK 12. Nov. 98: —

„ The Standard-Sand-Filters run 3 to 5 days without trouble and „ give even with the very thickest concentrated liquor an absolutely „ clear product. Considering the effect of filtration and the economy „ in labour and the saving in cloth, we think them sonsiderably „ superior to any other construction.

SUGAR WORKS NOSOWSKA express themselves as follows, 14. Nov. 98: —

„ The Standard-Sand-Filters show beautiful results. Compared „ with the pocket-filters the juice is as to brilliancy and colour far „ superior even if the Standard-Filter is forced more than advisable. „ We filter $4^1/_2$ to 5 days, and up to the last hour the juice „ remains very fine. The washing out, the discharging and the „ refilling are very simple and the loss in sand nil as we have had the „ same sand in use already for two months. All these advantages— „ the great simplicity and the entire doing away with any filter-cloth — „ make the Standard-Filter preferable to any other construction.

SCHEDROW SUGAR CO. LD: — 9. October 1899.

. . . The Standard-Sand-Filters works splendidly . . .

NOSOWO-KOSARSKAE Sugar Works: — 23. October 1899.

. . . The Standard-Sand-Filter does well, I will order two more shortly . . .

LEWASCHEWO-WRITOWETZKI SUGAR FACTORY: — 3. November 1899.

. . . I have to thank you for the work done by the Sand-Filters — from the very first day they proved such a succes that I shall do away with all my old pocket-filters.

COUNT W. A. BRANITZKI SUGAR WORKS: —

. . . three Standard-Filters serve us to filter the concentrated juice from 600 tons, each filter working 3 to 4 days. The juice is brilliant, the manipulation is very simple, and there is no chance of losses in sugar. As they pass the most concentrated liquor easily these filters are very valuable to our works.

OFFICE OF POTSCHAPINO: — 19. Nov. 1899.

. . . we are well satisfied, as the Filters give up to 1% more purity, running 4 days with brilliant liquor.

REFINERY KISKINSK: —

. . . we prefer your Sand-Filters to any other construction as they are simple and can be emptied quickly. The purity of the filtered liquor is always 0·5% higher than with pocket-filters . . .

List of Sugar Works which have adopted the Standard-Sand-Filters: —

Blagodatenskoe Sugar Factory (Raw & Granulated)
Berdiczew „
Ertil „
Gorodok „
Ilincy „
Kapustiany „
Kislin „
Kijancia „
Lumbimoska „
Malo-Wiski „
Nowo-Tawolzanka „
Nosowka „
Poczapincy „
Salimonki „
Sieniawa „
Sumsko-Stepanowka „
Stepanowka „
Smiela „
Schpanow „
Schpola „
Sczedrowa (working with the Ranson Process)
Tschupachowka „
Weprik „
Wojtowcy „
Goldbeck „ (Raw Sugar)
Several Export Orders for Amerika through agents
Charkow Sugar Refinery
Sumy „ „
Pjena „ „
Odessa — largest refinery in Russia — several Orders.

Several Orders for Colonial Sugar Works
etc. etc.

II. Prices for general Standard-Sand-Filter Arrangements.

1	Code words (beginnings)		Gun	Gur	Gus	Gut	Gym	Gyr	Gul	Gum	Guid	Gold	—	Code words (endings)
2	Capacity of Factory in tons Raw mater. p. 24 hours		100	200	300	400	500	600	700	800	900	1000	—	—
3	Clarified juice filtration or thin liquids	£	120	120	240	240	360	360	480	480	600	600		shot
		$ gold	586	586	1072	1072	1758	1758	2344	2344	2928	2928	—	
		metr. tons	0·8	0·8	1·6	1·6	2·4	2·4	3·2	3·2	4·0	4·0		
4	Concentrated juice filtration or heavy chemical liquids	£	120	120	240	240	360	360	480	480	600	600		nard
		$ gold	586	586	1072	1070	1758	1758	2344	2344	2928	2928	—	
		metr. tons	0·8	0·8	1·6	1·6	2·4	2·4	3·2	3·2	4·0	4·0		
5	Syrup filtration or sticky liquids	£	120	120	120	120	240	240	240	240	360	360	360	set
		$ gold	586	586	586	586	1072	1072	1072	1072	1072	1072	1072	
		metr. tons	0·8	0·8	0·8	0·8	1·6	1·6	1·6	1·6	2·4	2·4	2·4	
6	Feed water filtration	£	120	120	120	120	240	240	240	240	360	360		tural
		$ gold	586	567	586	586	1072	1072	1072	1072	1072	1072	—	
		metr. tons	0·8	0·8	0·8	0·8	1·6	1·6	1·6	1·6	2·4	2·4		
7	25 tons raw sugar for Refining	£	—	—	—	—	—	—	—	—	—	—	120	Bansele
		$ gold	—	—	—	—	—	—	—	—	—	—	586	
		metr. tons	—	—	—	—	—	—	—	—	—	—	0·8	
8	100 tons Raw Water	£	—	—	—	—	—	—	—	—	—	—	120	Bune
		$ gold	—	—	—	—	—	—	—	—	—	—	586	
		metr. tons	—	—	—	—	—	—	—	—	—	—	0·8	

All prices include the necessary fittings, (but no connections and not sand) packing and delivery f. o. b.
Filter Sand supplied at a rate of £ 2:10: — $ 12.20 per metr. ton f. o. b., bags included.
Quotations are subject to the fluctuations of the market.

Terms:—Half on ordering, balance on delivery or special terms.

BERLIN: (B. P. A.) - C. 2.

GEO. STADE.

Geo. Stade, Civil-Engineer, Berlin: (B. P. A.) - C. 2.

Technical Departments for Sugar Works & Distilleries, etc.

I: CANE & BEET SUGAR MACHINERY of any capacity; construction & reconstruction of Beet & Cane-Sugar works; Modern Refineries with or without charcoal; Boiler Houses for bagasse or coal (Freitag's coal dust firing); Boiler Feed Pumps for boiling hot water. Arrangements of sugar houses with Patent Pans yielding within 12 to 72 hours (according to quality required) in one or two products all commercial sugar complete from masse-cuites and refuse-molasses — no more tanks, consequently great economy in labour and fuel, absolute cleanliness. Electrically, water-driven & Express Centrifugals. Boilers, Engines & Pumps for all purposes of highest efficiency. Mechanical Filters, Superheated clarification; Bagasse-Furnaces; Evaporating Pans of newest type. Own Patents & System for extracting sugar from canes; Centralisation of all Machinery with electric motion; Automatic Lubrication; Cane Factories working without other fuel than Bagasse. Granulators for white sugar, etc. Express-Pumps

II: RUM DISTILLERIES — SPIRIT REFINERIES. Own System & Patent for fermenting molasses; ventilated fermenting rooms-highest yield possible; Automatic Stills & Rectifiers with Fusel Oil separation. Central Pumping Engines.

Factory built: THE WEST INDIA RUM REFINERY, BARBADOS, etc.

III: STORES; FITTINGS; IMPLEMENTS: Railway material; steam-ploughs; complete work shop arrangements; Boiler-Fittings, Cocks & Valves (never leaking ones a speciality). Compositions for steam-pipe covering; Lighting arrangements of buildings (electric, acetylene, gas); India Rubber; Durit packing & hose (superior to asbestos & rubber, per cwt. £ 22 = $ 107); Registering instruments i. e. — Thermometers (£ 12 = $ 58) — Pressure Gauges (£ 7 = $ 34). Control meters for liquids (£ 30 = $ 146); Brasmoscopes for exact boilings of masse-cuites (£ 9 = $ 44); Experimental Centrifugals for steam, electricity & hand (£ 5 to 26 = $ 25 to 126); Experimental Filter-Presses (£ 6 = $ 30); Automatic registering scales for Sugar (bag filling & sewing), Liquids, Beets etc. (from £ 23 = $ 112); Automatic lubricating pumps (£ 5 = $ 25). Steam Regulators — no reducing valves — guaranteed thoroughly reliable (from £ 5 to 50 = $ 25 to 243). Manures & chemicals at wholesale prices.

IV: LABORATORIES; INSTRUMENTS; ANALYSES: Complete installations i.e.:

A: (Code word "Liebig") to suit the wants of small Factories . . . . . £ 30 = $ 146 — f. o. b.

B: (Code word "Howard") for control of large sugar works . . . . . £ 65 = $ 316 — f. o. b.

C: (Code word "Pasteur") for Central Factories with Distilleries . . . . . £ 85 = $ 413 — f. o. b.

D: (Code word "Robert") with implements for soil & manure analysis . . . . . £ 125 = $ 607 — f. o. b.

Special combinations promptly attended to.

Reconstruction of old Polariscopes into guaranteed "Standards" — at moderate prices —.

New Patent Polariscopes . . (from £ 8 to 50 = $ 39 to 243);
Microscopes . . . . . (from £ 5 to 100 = $ 25 to 485);
Chemical & technical Balances (from £ 5 to 50 = $ 25 to 243);
Ice machinery for laboratories (from £ 15 to 50 = $ 73 to 243);
Beet disintegrators . . . . (from £ 5 = $ 25);
Meteorological Instruments . (from £ 10 = $ 49);
Standard-Typewriters with full visible writing £ 24 = $ 117.

V: REPORTS; CONSULTATIONS; PATENTS. Estimates for machinery and Processes for Cane & Beet Sugar Manufacture & Refining and Distilleries supplied to order at shortest notice. Patents attended to for all countries.

VI: REPRESENTATIONS; AGENCIES, temporary or permanent, undertaken for the Continent or Abroad.

Charges:

According to tariff of "Associated G. Architects & Engineers Union", — (no commission, all discounts credited); or Special Terms. —

THE

Standard-Sand-Filter

in practical use

for Cane Sugar Manufacture.

REPRINT OF TWO PAPERS ON

MECHANICAL FILTRATION

By

Mr. C. Hedemann, Hawaiian Islands, read before the Meeting of 1901 of

The Hawaiian Sugar Planters' Association,

Committee on Machinery

(vide The Planters' Monthly, Honolulu)

1901, December issue, page 582 ff.

and

Mr. W. Tiemann, Brasil (formerly Egypt) published in: —

(The International Sugar Journal, Manchester)

November No. 1901, page 603 ff.

For further particulars as to prices etc. address the sole agent of The Patent Standard-Sand-Filter for export: —

Geo. Stade, Berlin: C. 2.

The Standard-Sand-Filter on Java

East India.

A report just received from that island, which like Hawaii is one of the most advanced sugar producing countries with regard to the application of most modern machinery, says: —

"The installation of the Standard-"Sand-Filter plant on the three "factories supplied last crop **is a** "**brillant success.**"

29. October 1901.

SAND FILTERS.

It is evident that there is a growing demand in almost all our sugar houses for a good mechanical filter. The settling of the impurities in the juice after leaving the old style clarifiers, or the Deming apparatus, is at the best not entirely satisfactory, and the juice seldom reaches that transparent state of clearness, without floating impurities, which is so much desired. In some few mills, the old style bag filters are still used, and the inconvenience and expense connected with keeping the bags whole, clean and in working order without leaks, are drawbacks well known to every manager. **These disadvantages are almost common to all filters using cloths as a filtering medium.**

Some years ago, an elaborate system of sand filters was installed in Ewa mill, and a similar installation is now in operation in the Kealia mill. It consists of a large number of open, rectangular tanks, fitted with a perforated plate or strainer, a few inches from the bottom. On this plate is placed a thick layer of beach sand, through which the juice passes to the bottom, from where it is conducted to the next filtering tank, located below the first one, and so on in several rows. Gums and other impurities in the juice will, however, soon choke the top layer of the sand, necessitating every now and then the stirring up of the surface with a rake, to allow the juice to pass down to the lower layers, demandlng a great deal of labor and attention, for **which reason this filtering process was very soon discontinued in Ewa mill.**

Last season, the manager of Oahu plantation imported a battery of eight **„Standard“** sand filters from Germany *). **As these are constructed on an entirely different principle and have given great satisfaction,** the following brief description may be of interest:

The filter consists of a cylinder about 28 inches in diameter and 6 feet high with conical bottom. In the center of this cylinder is fixed a perforated pipe, 8 inches in diameter, also with a conical bottom, communicating with the delivery pipe. Between this outside cylinder and the perforated pipe, a system of conical rings is arranged in such a manner that one ring stands on the top of the other, the system being completed by a large ring at the bottom. The seats of these rings touch the outside cylinder but leave sufficient space for the juice to circulate. Beach sand is placed between the perforated pipe and the cylinder shell, where it forms a filtering surface between the

* GEO. STADE, BERLIN: C. 2.

rings. The juice to be filtered enters the filter through the pipe at bottom, fills the filter up to the air cock, and passes under a slight pressure through the sand to the inner perforated pipe. The filtered juice issues from the delivery outlet at bottom. The coarseness of the sand varies according to the liquor to be filtered. For thin juice a smaller grain is required than for syrup. Under any circumstances, the perforation of the central pipe is regulated accordingly, to prevent the sand from passing trough. For ordinary diluted mill juice, the perforations in the inner tube are about 400 per square inch, same as centrifugal lining.

As soon as the sand is saturated with impurities, water is admitted to expel the remainder of the juice which is being filtered. The outlet below is then opened while the water is entering, and the sand washed out. The filter is now empty and clean again, ready for refilling. After washing the sand with running water and by means of an injector, the whole of the scum quickly separates, and the sand is again ready for use in the wet state.

The dirty sand is dropped into a tank provided with a perforated steam pipe and running water, for instance, the discharge water from condensers. The steam agitates and separates the sand from the dirt, which is washed away, and the clean sand is elevated to a hopper over the filters and used again. The efficiency of this filter is shown by the fact, that not only the external surface but the whole mass of sand is penetrated by the deposit of dirt from the juice.

The following data with regard to the actual work of these filters has been obtained from the chemist of Oahu Mill, viz.:

"Our eight sand filters have a sufficient capacity to handle the juice from 1,200 tons of cane per 24 hours; **they are washed out every 12 hours,** two at a time. Two men handle them; if at times assistance is needed, a man from the filter presses helps them out **The heating surface of evaporator and vacuum pans keep decidedly cleaner and the centrifugal capacity is remarkably increased, mainly when our second product is being dried."**

To this it may be added, that it takes about 30 minutes to clean the sand in the tank arrangement at Oahu Mill, **10 minutes to empty and clean out a filter, and about 30 minutes to refill it and get it started.**

Over fifty such filters are now being sent out from Germany*) to be installed in the various sugar houses under the control of Messrs. H. Hackfeld & Co., and the Honolulu Iron Works Co. is building eighteen, ten of which are for the Hawaiian Commercial & Sugar Co.'s new mill, and eight for the Honolulu Sugar Co.

*) GEO. STADE, BERLIN: C. 2.

The sand washing machine for the first mentioned place, will consist of an inclined revolving drum and will be self-acting. The dirty sand enters the upper end and escapes clean at the lower end, while a stream of water passes through the drum in the opposite direction.

Honolulu, November 14, 1901. *C. Hedemann.*

THE STANDARD SAND FILTER.

By Walter Tiemann.

The recent excellent results obtained with the Standard Sand Filter in Hawaii, one of the most advanced raw sugar-producing countries, gives one some excuse for drawing attention to the usefulness and efficiency of this filter. The first one introduced into that country proved so successful that during the last year over eighty more have been erected.

There can be no doubt that the filtering qualities of sand are not surpassed by any other material as regards cheapness, ease of manipulation, and regeneration. This is a fact well known and made use of not only for sugar solutions, but also to a far larger extent for water filtration, milk filtration, &c., where, imitating nature, an extensive filtering surface is established, as in the case of large waterworks, giving the best results as to clearness, and also from a bacteriologico hygienic point of view. Of course for clarifying water or sugar solutions in factories the largest possible filtering surface ought, for practical reasons, to be given in the most compact form, and the facilities, emptying, and cleaning, are weighty details to be taken into sonsideration.

The new Standard Sand Filter has the merit of combining the largest possible filtering surface with the smallest requirements of space. The advantages claimed for it of absolute cleanliness and facility in handling are evident, and the sparkling brightness of the filtered solution is not surpassed by any other system, not even charcoal.

The effect is extraordinary, even with the most cloudy solution, as is confirmed by personal testimony. The Oahu Sugar Company recently wrote through Mr. Aug. Ahrens, their managing director, to Mr. Geo Stade, Berlin: — "The Standard Sand Filter plant you forwarded in October for our sugar-works, dealing with 1500 tons of canes per day, has been worked for the whole crop now. The success of this new arrangement is such that it causes general astonishment, and I am extremely satisfied with the work done. The heating surfaces of the different **pans remain very clean;** but what I consider to be of more importance is that **we receive now a brilliant and entirely clean juice**

and better molasses for reboiling, and consequently **a considerable higher yield in all sugars.** I have not the slightest doubt that a good many of our sugar-works will go in for your Standard Sand Filter after having convinced themselves of the good work done in our mill. Other filters have been repeatedly tried here, but have entirely failed to give satisfaction. I have already had plenty of visitors inspecting your plant, and it is commonly declared to be of highest practical value."

The filters run as long as 4-8 days, and up to the last hour the juice remains very fine. The washing out of the filter takes about 30 minutes, and there is no sugar left ia the discharged sand. Loss in sugar, such as occurs with filter-cloths, is entirely excluded. The discharging and refilling with the same regenerated sand is very simple. After washing the sand for a few minutes with running water or by means of an injector, the whole of the scum quickly separates, and the sand is ready for again using in the wet state.

The Standard Sand Filter is in general use for thin and concentrated juice, all kinds of syrups, and refinery liquors.

By means of a thorough purifying of the juices, and the consequent complete disparition of all deposits caused by defecation and saturation, as well as of all substances in solutions, the factories are of course able to turn out a much better quality of sugar. If the thin syrup is well filtered, the concentrated syrup is much easier to deal with, being free from foreign substances. In many factories a filtration of the concentrated juice is a great necessity, but it does not take place, for the simple reason that up to the present no suitable and sufficiently practical filter has been found for this purpose. Deposits form subsequently in the thick juice, especially through the use of sulphurous acid, so that the syrup is often of a very muddy appearanee. If the filter above described be installed for this purpose, a product of perfect quality is obtained, and also much better by-products. A greatly improved vaporisation and crystallisation of the clear syrups thus obtained is also very noticeable. Besides the splendid mechanical filtration, an undoubted chemical action is set up in regard to the alkaline deposits, which influence the crystallisation, and this action has been scientifically demonstrated.

All these advantages, the great simplicity and the entire doing away with any filter-cloth the facility of manipulation and the quickness with which the sand is regenerated, combined with the limited requirements as to space, and the absolute guarantee for obtaining a splendid mechanical filtration, indicate that the Standard Sand Filters are likely to be appreciated by all sugar manufacturers.

The Standard Sand Filter in Mexico: —

Mr. GEO. STADE, Berlin, Germany. NEW-YORK, March 29th, 1902

Dear Sir,

Replying to your inquiry with regards to the working of the Standard Sand Filters in the sugar factory which I erected for General J. B. Frisbie of Mexico City, and which factory is called the "Hacienda Atlixtac" located in the State of Guerrero, I am glad to be able to say, that the **two Filters which I purchased from you, worked very satisfactorily in every respect,** and I am figuring on installing the Standard Sand Filter in a number of other houses in Mexico. **It is possible with these Filters, to absolutly avoid inversion,** which is not the case with Bag Filters, and **it is possible to empty one, thoroughly cleanse it and re-fill it in 20 minutes. They are simple in construction, and any man of ordinary intelligence can be taught to operate them** properly, after a few hours experience.

With kind regards, I am, Very truly yours, (signed) G. P. Anderton.

The Standard Sand Filter in Hawaii again: —

An emminent West Indian sugar expert, in forwarding a testimonial about the working of the Hawaiian Filter Plants writes: —

"I saw the quality of the juice and the sugar after passing through the filters and that counts for more "than testimonials."

The testimonial reads as follows: —

"I am very glad to state that the Standard-Sand-Filters delivered to us by Mr. Geo. Stade, Berlin: C. 2, "have been working quite satisfactorily since we started them one month ago."

12. FEBRUARY 1902.

The Standard Sand Filter in Spanish Sugar Works: —

LA AZUCARERA DE TULEDA, Navarra.

We have much pleasure to inform you that the Standard Sand Filter plant put up last crop in our sugar usine gave us full satisfaction and the results obtained came up fully to our expectation.

The filter plant gave the liquor a brillancy and fire the least equal to anything we have ever seen before.

According to our experience we consider the **Standard Sand Filter plant a very profitable arrangement** and a full financial success. With a very small quantity of sand the Standard gives the largest possible filtering surface and the working manipulations as well as the cleaning of the sand are simple, effective and very cheap compared with other systems.

It gives us great satisfaction to put these results before the public. 4. JUNE 1902.

The Standard Sand Filter in Spanisch Factories: —

SUGAR USINE CASETAS, ZARAGOZA.

We have the pleasure to inform you that we are very much satisfied with the work done by the Standard Sand Filters in filtering the concentrated juice coming from the triple-effet.

Our sugar factory works off 500000 kilo or 500 tons per day and all the resulting low-products, i. e the second and the third sugars, are disolved and reboiled. These melted up sugars are mixed with the resulting concentrated juice from the triple-effet at a concentration of 70% Brix or say 38 degree Bé.

Consequently **we filter all this mixed up liquor** — sugar and juice — over our three Standard Filters. The filtered liquor is of a matchless quality and absolut brightness and the whole filter-plant works to perfection, as to quality as well as to quantity.

We may add here that the resulting liquor as it comes from the Standard Sand Filter is boiled down at once and is manufactured into refined sugar & **without further treatment gives cubes, pieces and granulated** as required for the market.

Surely, according to the results obtained we must consider the work of the whole **filter-arrangement as a great success and in our opinion it is the most effective, the simplest and cheapest method of filtration.**

We can recommend the Standard Sand Filter to all sugar works most sincerely, and will be glad to answer any inquiry accordingly.

24. NOVEMBER 1901.

The Standard Sand Filter in the Argentine Republic: —

In ordering further filter plants the proprietor of the Ingenio Providencia near Tucuman states,

"The two filters sent out last crop are working well"

19. OCTOBER 1901.

The Standard Sand Filter in Hawaii again: —

In placing an order for 18 filters the Honolulu Iron Works Co. express themselves as follows,

"These filters are particular suitable for the Cane Sugar Industry"

10. OCTOBER 1901.

OAHU SUGAR COMPANY.

WAIPAHU, OAHU — (Hawaiian Islands).
May 27, 1901.

GEO STADE, ESQ., BERLIN: C. 2.

My dear Sir: —

The Standard Sand Filter plant you forwarded in October for our sugar works dealing with 1500 tons of canes per day has been working for the whole crop now.

The success of this new arrangement is such that it is astonishing to everybody, and I am extremely satisfied with the work done. The heating surfaces of the different **pans remain very clean**; but what I consider to be of more importance is that **we receive now a brillant & entirely clean juice and better molasses** for reboiling and consequently **a considerable higher yield in all sugars.**

I have not the slightest doubt that a good many of our sugar works will go in for your Standard Sand Filter after having convinced themselves of the good work done in our mill. Other filters have been repeatedly tried here but have entirely failed to give satisfaction. I had already plenty visitors inspecting your plant which is generaly declared to be of highest practical value.

Yours truly,

AUG. AHRENS,
managing director of The Oahu Sugar Works.

NOTICE: —

Since writing the above the following mills in the Hawaiian Islands have accepted the Standard Sand Filter to clarify the whole of the juice coming from the Superheater (doing away with "Eliminators" entirely): —

HANAMAULU SUGAR FACTORY	working	1600	tons	Canes	per	day	contracted	for	a	9	Filter-Plant
LIHUE PLANTATION COMPANY	„	1600	„	„	„	„	„	„	a	9	„ „
KEKAHA SUGAR Co.	„	1600	„	„	„	„	„	„	a	9	„ „
HILO SUGAR WORKS . . .	„	1000	„	„	„	„	„	„	a	9	„ „
PIONEER MILL	„	1600	„	„	„	„	„	„	a	6	„ „
KIPAHULU SUGAR Co. . . .	„	1000	„	„	„	„	„	„	a	6	„ „
KOLOA SUGAR Co.	„	1000	„	„	„	„	„	„	a	6	„ „
The OAHU SUGAR Co. . .	works off	1500	tons	Canes	with	8	Filters.				

COMPLETE FILTER-PLANTS are always kept on hand to secure prompt delivery. Orders can be executed within 24 hours notice.

July 1901.

GEO. STADE, C.-E., BERLIN C. 2.

The Standard Sand Filter in Spanisch Factories: —

SUGAR USINE CASETAS, ZARAGOZA.

We have the pleasure to inform you that we are very much satisfied with the work done by the Standard Sand Filters in filtering the concentrated juice coming from the triple-effet.

Our sugar factory works off 500000 kilo or 500 tons per day and all the resulting low-products, i. e. the second and the third sugars, are disolved and reboiled. These melted up sugars are mixed with the resulting concentrated juice from the triple-effet at a concentration of 70% Brix or say 38 degree Bé.

Consequently **we filter all this mixed up liquor** — sugar and juice — over our three Standard Filters. The filtered liquor is of a matchless quality and absolut brightness and the whole filter-plant works to perfection, as to quality as well as to quantity.

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The Standard Sand Filter in the Argentine Republic: —

In ordering further filter plants the proprietor of the Ingenio Providencia near Tucuman states,

"The two filters sent out last crop are working well." 19. OCTOBER 1901.

The Standard Sand Filter in Hawaii: —

In placing an order for 18 filters the Honolulu Iron Works Co. express themselves as follows: —
"These filters are particular suitable for the Cane Sugar Industry." 10. OCTOBER 1901.

We beg to say that those supplied to the Puunene Mill and to the Honolulu Plantation Co. eighteen in all have given entire satisfaction. We inclose you herewith testimonial from the Manager of the Honolulu Plantation Company who is particularly well pleased with his installation.

HONOLULU, T. H., JULY 24, 1902. HONOLULU IRON WORKS CO.

Your favour of the 21. inst. in re information of the working condition of 9 Sand Filters supplied this mill by your company, known as the Standard Sand Filters of Geo Stade of Berlin, duly received.

We take pleasure in reporting to you that the 9 Sand Filters which we have, handle some 218,000 gallons of juice per 24 hours to splendid effect. In fact the results which we have from our Sand Filters we believe have during the past season's run on a 10,000 ton crop **repaid to us at least 50% of their cost value** in facilitating the work in the boiling house, first by lessening the time of settling of the juices in the settling tanks, next by reducing the troubles which we have had with our evaporator by reason of the clearer juices and facilitating the evaporating work, increasing the efficiency of our evaporator at least 10% in the same time given.

We shall soon require more of these Filters as the output of our house must soon be increased, and do not hesitate to recommend the Standard Sand Filters.

AIEA, OAHU, T. H. JULY 23, 1902. Manager's Office.
HONOLULU PLANTATION COMPANY.

The Patent

Express Evaporator

the most modern evaporator up to-date working with natural circulation only and combining

highest efficiency with greatest simplicity

at lowest initial cost.

List of Sugar Works

where The Express has been adopted.

Extract from certificates of success in working.

Prices for complete evaporating plants.

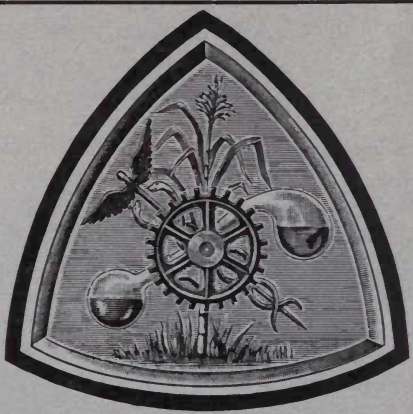
GEO. STADE,

Civil-Engineer & Technical Chemist,

Expert in Sugar & Spirit Manufacture & Refining,

Formerly Member of the Imperial Patent Office (Berlin); Correspondent of all leading Sugar Journals; Technical Adviser and Director of Sugar Works, Distilleries, and Experimental Stations.

Memb. Assoc. G. Engineers; Fellow G. Chemical Society; Memb. Union Sugar Technologists.



Technical Departments for Sugar Works & Distilleries etc.
(Established 1888-formerly Geo. Stade & Co.): —

I: Cane & Beet Sugar Machinery.
II: Rum Distilleries - Spirit Refineries.
III: Stores - Fittings - Implements.
IV: Laboratories - Instrum. - Analyses.
V: Reports - Consultations - Patents.
VI: Representations - Agencies.

Bankers: "Deutsche Bank" Berlin (& London).

Address for Correspondence: "GEO. STADE, BERLIN: C. 2."

Registered Cable Address: **"Geostades Berlin".**

Code used: A. B. C., 4th Edition.

I. Introduction.

The efficiency of an evaporating system heated by steam is dependent on the following vital points: —

1. **On the circulation of the evaporating liquor** around the heating surface. The more effective this circulation takes place in a certain time the more rapid is the transfer of the units of heat from the heating medium (the steam), to the evaporating liquor — as the observations of Joule, Ser, and others prove, that the additional transfer of heat between the steam and the liquor, on account of the circulation of the latter, is equal to the cuberoot of the acceleration of the liquor.
2. **On the circulation of the heating medium around the heating surface.** It is a well known fact that the more the steam comes in rapid contact with the heating surface the more efficient is the heating surface — even if no complete condensation takes place.
3. **On the rapid removal of the condensed-water.** The water, of course, acts as a considerable hindrance in forming a bad heat-conducting coat on the heating surface separating the steam from heating surfaces. The more quickly and the more completely the condensed-water is drawn off, the more effective is the heating surface, consequently the removal of the water will take place more quickly in short inclined tubes, for instance, than in long vertical or horizontal pipes.
4. **On the removal of the air in the heating system.** Air is a very bad heat-conducting medium, it is specifically heavier than steam and consequently collects in the lower part of the heating system from which it has to be drawn oft either by a separate pipe or blown out with the condensed-water.
5. **On the removal of the gas.** This is particularly the case in a system heated by vapors containing non condensing gases as for instance steam generated from sugar juice. The gas collects on the upper part of the heating system and must be drawn off accordingly as it otherwise renders a part of the heating surface useless.
6. **On the clean surface of the heating system in and outside the steam chamber.** Outside: — incrustations have to be avoided, inside: — the coating formed by the oil usually contained in exhaust steam, is also a non conductor of heat, the action of which is of the greatest importance.
7. **On the material of the heating surface.** Copper and brass conduct the heat about 25 % better than iron or steel.

8. **On the rapid removal of the generated Vapor** and the unthrottled entrance of the heating steam. Consequently an ample section of all pipes, thorough effective condensation and vacuum-pumps working with a minimum of dead space between piston and covers are required to keep up the efficiency of an otherwise perhaps well-constructed evaporator.

Furthermore as to the advisability of the acceptance of a special evaporating system, the following points have possibly to be taken into consideration.

a) The evaporator should work without any loss by entrainment; consequently safety devices must be provided to prevent losses: — which are then impossible even if the system is carelessly handled.

b) The working of the system should be as simple and automatic as possible to enable even unskilled labourers to attend the evaporator, of course, with the usual superintendence.

c) The heating system should be arranged in such manner that a thorough cleaning is possible and that defective tubes can be changed without taking the whole system apart.

d) No deterioration of the liquor must take place during the evaporation, consequently the system should work under vacuum throughout, in any case when cane-sugar liquor is to be evaporated.

e) Last not least — the maximum of liquor should be evaporated per unit of heating surface at a minimum expense as to cost of plant and quantity of steam.

II. Construction of the Express Evaporator: —

In the design of the Express Evaporator, the above mentioned points have been carefully taken into consideration with a view to combine the greatest simplicity with highest efficiency and operating without more or less complicated mechanical means of circulation.

AIR, GAS, AND WATER ESCAPES FROM THE CALANDRIA.

The fundamental principle of this most modern successful heating and evaporating system consists in the application of inclined tubes which form a cross. The tubes expand into the calandria. The steam enters into the latter whilst the liquor circulates through the tubes inside, the steam circulating outside. The condensed-water condenses on the tubes and runs or drops rapidly off through the condensed-water discharge. These inclined tubes being however very short, the water runs off the same better than from vertical pipes and effects in this manner a close contact between the steam and the heating metal. The noxious gas collects on the top of the system and is blown out or drawn off through a pipe. This cleansing of the system from gas is also

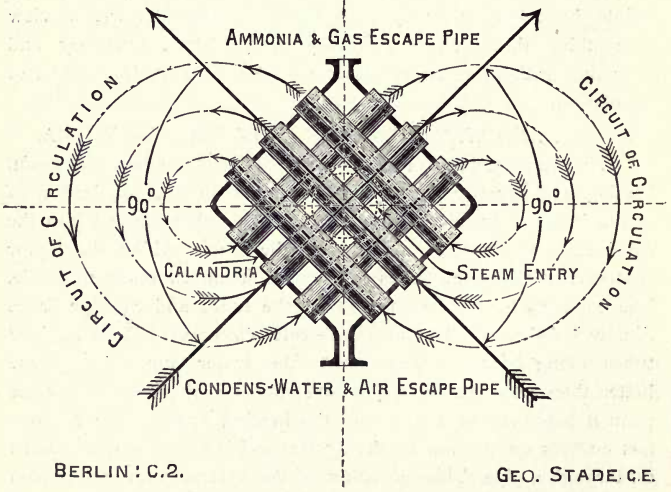
very effective as at the highest point of the system no large surface exists for the gases to collect. The air escapes through a separate pipe. The condensed-water is collected in a very effective condensing-trap with air exhaust, a gauge-glass being employed to control the working of the trap.

THE NATURAL CIRCULATION OF THE SYSTEM.

By the force of the vapor formed inside the tubes in introducing steam into the calandria, the liquor is discharged from the tubes in the direction of the arrow (inside the tubes). This direction, however, is not vertical but inclined and hereby the effect of the circulation is augmented. It is evident that the ejected liquor cannot fall back into the tube. The imparted speed and the gravity of this ejected liquor forces the same to take a lateral course, describing according to the law of gravitation, a parabolic line while on the other side the generated vapor-bubbles escape to the surface. It is now evident that — as the same liquor cannot fall back into the same tubes — the steam escaping through these tubes must continually be replaced by the liquor at the bottom thus **forming a natural suction drawing all the liquor from the bottom through the said tubes.**

This liquor at the bottom, however, is always free from vapor which subsequently escapes in the above indicated manner. A powerful continuous natural circulation now takes place and without any mechanical means — the liquor passing from one side of the system to the other in the form of an " ∞ ".

THE EXPRESS EVAPORATOR
(SCHEME OF CIRCULATION).



BERLIN : C.2.

GEO. STADE C.E.

Whilst being heated the liquor commences strongly to circulate as each tube on both sides delivers the liquor in the only possible direction and all currents of the different tubes unite in forming the same parallel lines of circulation. The heating and boiling process presents peculiarly characteristic features, that is to say, the movement is so strong and at the same time so steady that it is almost invisible.

This silent movement is, of course, very important, no juice being thrown to the top. The liquor may boil as violently as possible, yet it does not rise but remains at the once assumed level. The reason of this regular and steady circulation is that all the currents are forced to travel always in the same direction. All portions of the liquor have simply to traverse an angle of 90^0 to pass from one side of the tube into the other and on their way meet with no impediment from bubbling liquor as is the case with various old systems.

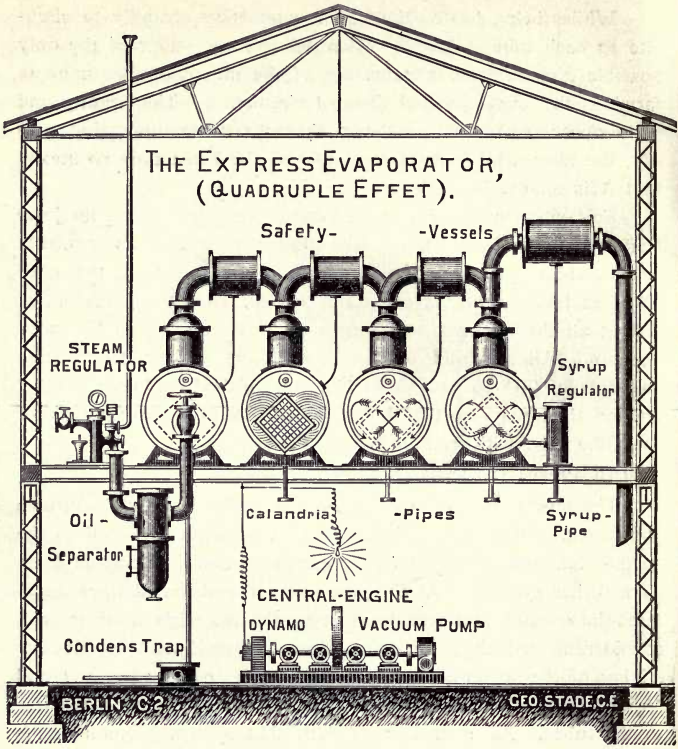
CIRCULATION OF THE HEATING STEAM.

The steam in the calandria works under equally favourable conditions. As the calandria need not be of larger section than the steam-inlet, the falling off in pressure is therefore not as great as in other systems. At the same time the steam at once separates into small currents in entering the calandria moving with considerable velocity. As cross-tubes are employed a continuous mixing of the steam takes place, whilst condensed-water, gas, and air can easily escape during the time the steam imparts its heat to the tubes. As a matter of fact, this system permits of the arrangement of the largest possible heating surface in the smallest space. Noxious surfaces do not exist in this system.

III. Operation of the Express-Evaporator.

The liquor to be evaporated enters the draw-in tanks supplied with automatic shut-off valves. Through adjusted cocks it enters bodies, kept at a constant level. The steam enters the calandria of the first body after being firstly freed of oil by means of the "Oil Separator" and is secondly kept at the same equal pressure required to work the whole system in an entirely automatic manner. The "Steam Governor" is a governor proper — (not an ordinary reducing valve) — and regulates exactly to the extent of 1/100 atmosphere. Condensed water and air escape through suitable pipes to a modern condensing trap. The gas (ammonia) is drawn as usual into the condenser. All bodies are supplied with effective safety vessels. The concentrated liquor passes the "Density Regulator" and is automatically drawn off by means of a pump at the same density.

By the force of the rapid circulation the tubes are always kept perfectly clean and the Express Evaporator is in this feature not surpassed by any other evaporating system.



As the tubes are of brass, they rapidly transfer the heat on account of being short and clean on both sides. No condensed-water and no oil adheres to the tubes to cause dead evaporating surfaces, both dropping off at once, thus making the heating surface most effective.

The generated steam is drawn over from one body to the other by strong calandria-pumps, all sections being carefully calculated and ample to give free escape to the vapor. The vapor of the last body is condensed in a modern counter-current condenser, the air being drawn off by an air pump of the best construction allowing no dead space, thus the very highest possible vacuum is obtained.

The entire heating system can also — if required — be easily cleaned by turning the casing at a right angle or by removing it by loosening two joints and drawing it out altogether.

As all the tubes are continually kept covered with liquor, no deterioration can take place, as is more or less the case with film evaporators, or systems working with uncovered tubes. This is of especial importance to sugar factories working with pure solutions.

TO SUM UP: —

The simplicity of the whole system unsurpassed by any new or older construction combined with the enormous working capacity hitherto unattained and without any artificial means of circulation causes "The Express Evaporator" to be appreciated (similar to The Standard Sand Filter for mechanical filtration) in all places where an effective evaporation-system is of vital importance.

IV. Reports of Factories using the Express Evaporator: —

Many thousands of square meters heating surface of the Express Evaporator are now in use and have surpassed the expectations of all competent experts. The following extracts of testimonials prove this fact: —

SUGAR WORKS SÄBISCHDORF, 21. January 1901.

By the new Express Evaporator the output of our Works has been considerably increased. We are glad to say that our **expectations have been surpassed as to the rapid work done.**

SUGAR WORKS WAIZENRODA, 11. December 1901.

We are exeedingly satisfied and the effect of the Express system is striking. **Incrustations did not take place,** thus the efficiency of the system remains unquestionably predominant.

SUGAR WORKS GUHRAU, 11. December 1901.

The system has proved a **success from the beginning.** The evaporation is so rapid that we have to check the steam.

SUGAR WORKS WIESMAR, 6. January 1902.

We are extremely satisfied with the work done.

SUGAR WORKS LANGENWEDDINGEN, 16. December 1901.

We hereby certify that the three Express Evaporators work very well, and have given us **full satisfaction** up to-date.

SUGAR WORKS KRAS-NCJABUGA, 2. December 1900.

The Express Evaporator has proved **fully satisfactory.**

SUGAR WORKS HADMERSLEBEN, 31. January 1900.

We are well satisfied with the work done by the Express Evaporator and would mention that the **heating surfaces remained entirely free of incrustation** on account of the rapid circulation of the juice. We can therefore recommend the "Express" for all heating and evaporating purposes most confidently to all sugar manufacturers.

SUGAR WORKS OLCHOWICE, 14. December 1900.

The Express Evaporator has worked unsurpassed for the whole crop and **at the finish the tubes were found to be perfectly clean. As regards the rapid transfer of heat we beg you to accept our best compliments.**

SUGAR WORKS BALAKLEJA, 11. December 1900.

We have much pleasure in certifying that the **work done by the Express Evaporator surpassed our expectations;** the boiling was far more rapid than before.

SUGAR WORKS GORODOK, 9. November 1900.

The Express Evaporator creates a most energetic but very equal boiling and in spite of the most intense evaporation the level of the juice remains the same — **there is no sudden rising of liquor.** — We consider the erection of the Express Evaporator as a very advantageous and paying investment for our Works.

SUGAR WORKS SABLINO, 12. November 1900.

A **cleaning of the tubes** of the Express Evaporator was **not necessary.** This proves that we could not do anything better than to accept this system.

SUGAR WORKS ZBOBROWTZE.

The boiling in the Express Evaporator is very uniform and though we have been working continuously for 3 months **no cleaning of the tubes was required** although we have been constantly **concentrating the liquor up to 35 Beaumé.**

V. List of Factories working with "The Express Evaporator": —

SUGAR WORKS: —

Wismar.	Sablino.	Kaluik.
Guhrau.	Zbobrowitze.	Sob.
Säbischdorf.	Bobrowize.	Nowo Tawolschansk.
Weizenroda.	Lugau.	Nikolaew.
Friederichsaue.	Saliwanschino.	Saliwonki.
Langenweddingen.	Bala.	Sosnowice.
Hadmersleben.	Uze.	Kujaono.
Salzwedel.	Fröbeln.	Gorodissche.
Krasncjabuga.	Puschkowa.	Paratiewka.
Olchowiec.	De Mark.	Rschawa.
Blakleja.	Guiremant.	
Gorodok.	Grebenki.	

Prices for "Express Evaporator" plants.

1	Code word beginnings:		Pro	Pul	Pur	Pel	Par	Pos	Pot	Pyl	Pit	Pons	Pim	Peg	Code word: Endings
2	**Capacity of Factory** in 24 hours	tons in 24 hs. (Beet, Cane)	200	300	400	500	600	700	800	900	1000	1200	1500	2000	—
		Wine (U. S. A.) gallons	42·000	63·000	84·000	106·000	128·000	149·000	169·000	190·000	211·000	254·000	370·000	420·000	
		Liter syrup à 25° Bè	60·000	90·000	120·000	150·000	180·000	210·000	240·000	270·000	300·000	360·000	450·000	600·000	
		Liter juice (à 15° Bx)	160·000	240·000	320·000	400·000	480·000	560·000	640·000	720·000	800·000	960·000	1200·000	1600·000	
3	Triple Effet complete steam-regulator, oil-separator, juice & syrup tanks	£	1011	1303	1410	1635	1950	2202	2583	2788	3093	3891	4737	6192	gura
		$ gold	4923	6345	6866	7962	9496	10723	12579	13577	15062	18949	23089	30155	
		metr. tons	18·3	23·6	25·4	29·4	35·5	40·4	46·6	51·9	57·2	71·0	86·5	114·4	
4	**Staging** complete	£	230	265	295	320	380	450	535	565	595	670	765	925	gabo
		$ gold	1120	1290	1436	1558	1850	2191	2605	2751	2897	3262	3725	4504	
		metr. tons	5·4	6·8	7·5	8·4	10·0	11·8	14·0	15·0	15·5	18·0	20·5	25·0	
5	**Vacuum Pump** with condenser & connections	£	197	197	304	304	397	397	397	510	510	610	834	1450	era
		$ gold	959	959	1480	1480	1933	1933	1933	2483	2483	2970	4061	7061	
		metr. tons	2·4	2·4	4·0	4·0	5·5	5·5	5·5	7·5	7·5	9·8	12·5	16·0	
6	**Total pos. 3, 4, 5**	£	1438	1765	2009	2259	2727	3049	3515	3863	4198	5171	6336	8567	amo
		$ gold	7002	8594	9782	11000	13179	14847	17117	18811	20442	25171	30875	41720	
		metr. tons	26·1	32·8	36·9	41·8	51·0	57·7	66·1	74·4	80·2	98·8	119·5	155·4	
7	**Quadruple-Effet** complete steam-regulator, oil-separator, juice & syrup tanks	£	1164	1557	1659	1929	2208	2574	2961	3338	3615	4410	5589	7224	ito
		$ gold	5668	7582	8079	9394	10752	12535	14420	16256	17605	21476	27218	35180	
		metr. tons	22·3	28·8	31·9	35·2	39·9	46·8	52·7	59·1	65·4	92·2	99·7	130·8	
8	Staging complete	£	250	300	335	365	440	505	595	635	670	765	915	1145	usa
		$ gold	1217	1461	1631	1777	2142	2459	2897	3092	3262	3725	4456	5576	
		metr. tons	6·0	7·7	8·5	9·5	11·5	13·2	15·6	16·7	17·5	20·5	24·7	31·0	
9	Vacuum Pump with condenser & connections	£	124	197	197	304	304	304	397	397	397	510	610	834	bala
		$ gold	608	959	959	1480	1480	1480	1933	1933	1933	2483	2970	4061	
		metr. tons	1·3	2·4	2·4	4·0	4·0	4·0	5·5	5·5	5·5	7·5	9·8	12·5	
10	**Total pos. 7, 8, 9**	£	1538	2054	2191	2598	2952	3383	3953	4370	4682	5685	7114	9203	ona
		$ gold	7488	10002	10669	12651	14374	16474	19250	21281	22800	27684	34644	44817	
		metr. tons	29·6	38·9	42·8	48·7	55·4	64·0	73·8	81·3	88·4	120·2	134·2	174·3	

All Prices include packing and delivery f. o. b.
Quotations are subject to the fluctuations of the market.

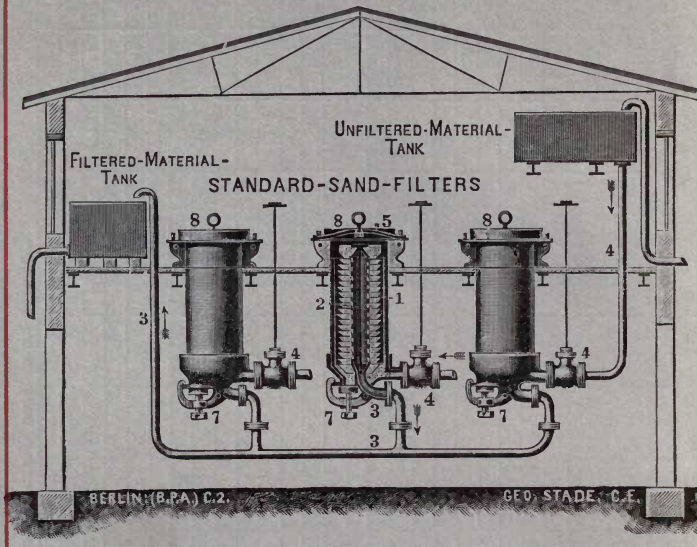
Terms:—Half on ordering, balance on delivery or special terms.

GEO. STADE, BERLIN: C. 2.

Geo. Stade, Civil-Engineer, **Berlin: C. 2.**

The Patent Standard Sand Filter

The simplest and most effective mechanical filter for sugar juice, refinery liquor, feed water, water-works &c.



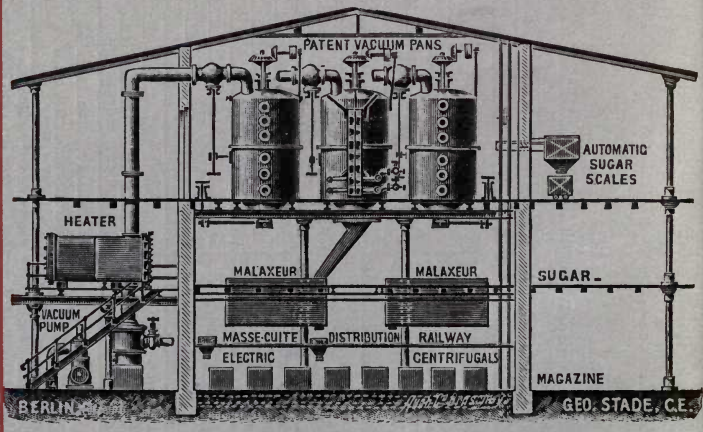
Brillant Effect — no Filter-Cloth — Great Economy

No inversion of sugar

Price: £ 120 or $ 586 incl. Sand f. o. b.

The Patent Standard Process

for granulating Low Products in about sixty hours as arranged in modern sugar houses.



No more storage tanks, great cleanliness and economy in labour &c.

ENQUIRIES and CORRESPONDENCE SOLICITED.

El Evaporador "Express".

Por GEO. STADE, C. E.,

BERLIN: C. 2.

I. Introduccion.

La eficacia de un sistema de evaporación calentado por vapor, depende de los siguientes puntos capitales:

1. *De la circulación del licor* evaporador en torno de la superficie que se ha de calentar. Mientras más activamente se verifica esta circulación en un tiempo dado, más rápida es la transmisión de las unidades de calor del medio calorífero, el vapor, al licor evaporador.

2. *De la circulación del medio calefactor* al redeor de la superficie por calentar, pues es un hecho muy bien conocido que mientras más vapor se pone en rápido contacto con la superficie por calentar, hay mayor eficacia en esta superficie, aun cuado sea completa la condensación.

3. *De la pronta remoción del agua condensada.* El agua, naturalmente, opera como un obstáculo considerable al formar un mal conductor en la capa de la superficie por calentar. Mientras más pronto y más completamente se remueva el agua condensada, más eficaz se hace la superficie por calentar; (en consecuencia la separación del agua se verifica más rápidamente en tubos cortos inclinados, como por ejemplo, en pipas largas verticales ú horizontales).

4. *De la remoción del aire del sistema calefactor.* El aire es un medio conductor del calor muy malo; es específicamente más pesado que el vapor (en consecuencia se aglomera en la parte más baja del sistema calefactor, y tiene que expulsarse ya sea por medio de una pipa separada ó aventársele por medio del agua condensada).

5. *De la remoción del gas en un sistema calentado por vapor que contiene gases,* (así por ejemplo, vapor generado por jugo de azúcar). El gas se reune en la parte superior del sistema calefactor, por consiguiente tiene que expelérsele, porque además hace inútil una parte de la superficie por calentar.

6. *De la superficie limpia del sistema calefactor, por dentro y por fuéra de la cámara de vapor.* Por fuéra: tienen que evitarse las incrustaciones. Por dentro: la capa formada por el aceite que el vapor agotado contiene es también un estorbo no-conductor del calor de la mayor importancia.

7. *Del material de que está hecha la superficie por calentar.* El cobre y el bronce trasmiten el calor cosa de un 25% más activamente que el hierro ó el acero.

8. *De la rápida separación del vapor generado y de la libre entrada del vapor calefactor.* Por consiguiente, una sección amplia de todas las pipas, una completa y eficaz condensación, y una bomba neumática que trabaje con el mínimum de espacio muerto entre el émbolo y la cubierta, son indispensables para sostener la acción de un evaporador que se halle bien construido.

Para poder aceptar con ventaja un sistema de evaporación, en lo sucesivo, deben tomarse en consideración las siguientes indicaciones:

A.—El evaporador tiene que funcionar por fuera, preparado contra cualquiera pérdida por arrastre; por consiguiente deben tenerse vasijas de seguridad para impedir las pérdidas, aunque el sistema esté manejado con descuido.

B.—La combinación operativa del sistema debe ser tan sencilla y automática cuanto sea posible, á fin de facilitar á los trabajadores inexpertos el manejo del evaporador, siempre por supuesto con la inspección necesaria.

C.—El sistema calefactor debe estar arreglado de tal modo que se haga posible una limpia completa, y que los tubos imperfectos se puedan cambiar sin tener que desarmar por completo el sistema entero.

D.—Durante la evaporación no debe verificarse ningún deterioro del licor; en consecuencia, el sistema debe funcionar al vacío por todos lados, especialmente si se evapora azúcar de caña en su clemento líquido.

E.—Finalmente y con particularidad, el máximum de licor debe evaporarse por unidad de superficie calorífera, al costo mínimo en cuanto á la planta y cantidad de vapor.

II. Construccion del Evaporador "Express".

Tomando en cuenta cuidadosamente los puntos arriba mencionados, el evaporador "Express" ha sido designado con la mira de combinar la mayor sencillez con el trabajo de mayor eficacia, sin medios mecánicos de circulación.

Escapes de aire, gaz y agua de la Calandria.

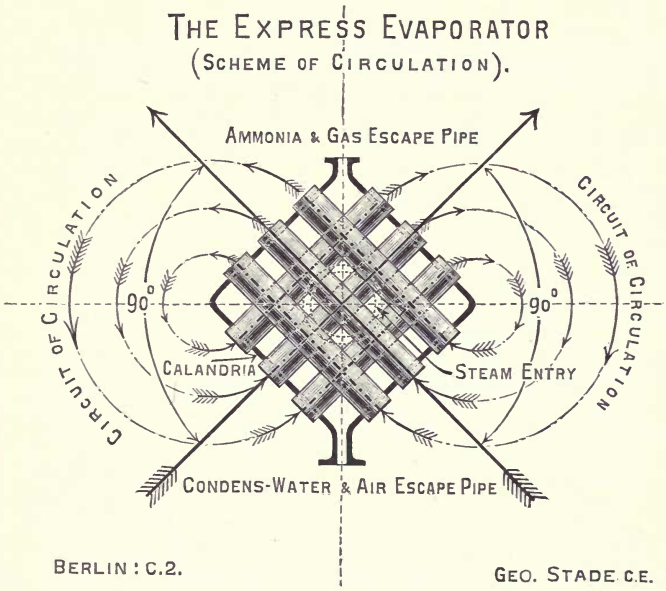
El principio fundamental de este sistema moderno de calefacción y evaporación, que tan buenos resultados ha dado, consiste en la aplicación de tubos inclinados que están formando una cruz. Los tubos se ensanchan dentro de la Calandria. El vapor entra á esta Calandria, mientras el licor circula por todos los tubos de adentro, y el vapor circula por afuera. El agua se condensa en los tubos y corre rápidamente por el escape de agua condensada. Sin embargo, como los tubos son muy cortos, el agua escapa por estos tubos inclinados más bien que por pipas verticales, y facilita de este modo un contacto inmediato del vapor con el metal calefacto. Los gases perjudiciales se juntan en la parte de arriba del sistema y son aventados ó arrastrados por la pipa de escape del gas. Esta limpia que se hace de los gases del sistema es también de buenos resultados, puesto que en el

punto más alto (y no grande) del sistema no existe una gran superficie que contenga los gases. El aire escapa por una pipa separada, y el agua condensada se reune en una trampa con escape de aire.

Circulación natural del sistema.

Por la fuerza del vapor formado dentro de los tubos al poner el vapor dentro de la calandria, el licor es arrojado fuera de ellos en dirección de la flecha (dentro de los tubos). Esta dirección sin embargo, no es vertical, sino inclinada, y debido á esto se establece la circulación. Es claro que el licor arrojado para afuera está forzado á irse por un lado formando (de acuerdo con las leyes naturales de la gravitación), una línea parabólica, mientras que por el otro lado las burbujas del vapor generado escapan á la superficie. Es evidente ahora que el mismo licor no pueda volver á caer en los mismos tubos.

La corriente que escapa por los tubos debe ser continuamente reemplazada por el licor que se halla en el fondo, formando de este modo una fuerza de succión natural, *que atrae todo el licor del fondo á través de los tubos.* Este licor del fondo, sin embargo, se encuentra siempre libre de vapor, el que más tarde escapa como se ha indicado. De este modo ahora, una poderosa y continua circulación se verifica de un modo natural y sin medio mecánico alguno. El licor va de un lado del sistema al otro formando la figura de un ocho " ∞ ".



Al calentarse el licor comienza á circular fuertemente, porque el tubo de cada uno de los lados arroja el licor en la única dirección posible. Todas las corrientes de los diferentes tubos se unen para formar líneas de circulación paralelas. Con este motivo,

el calentamiento y el hervor se verifican muy quietamente y el movimiento es muy fuerte, y al mismo tiempo tan silencioso que se hace casi invisible.

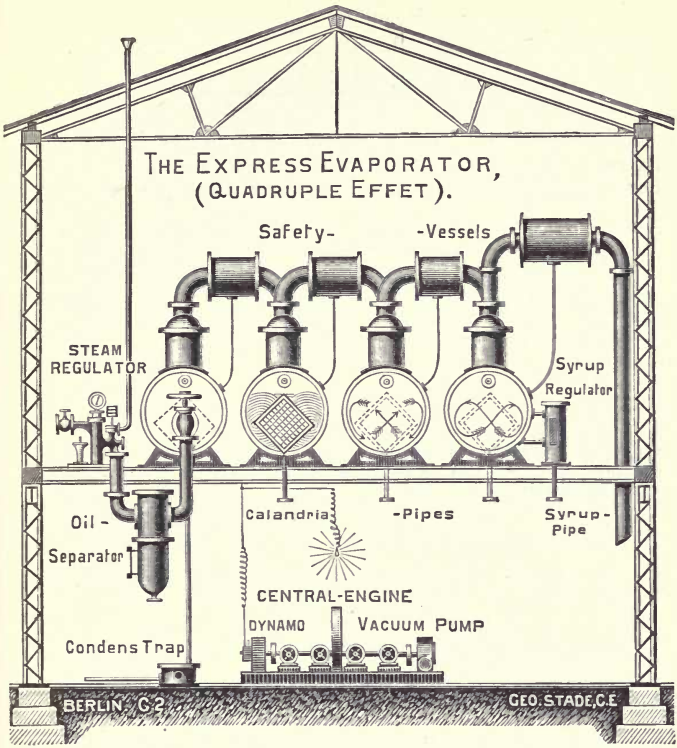
Este movimiento silencioso es naturalmente muy importante, y ningún licor se arroja para la parte de arriba. El hervor puede se, tan fuerte como sea posible, y á pesar de esto el licor no se eleva mucho y permanece en la superficie ya fijada. La causa de esta regularidad y facilidad en la circulación consiste en que la corriente va siempre ne la misma dirección paralela. Todas las partes del licor no tienen más que recorrer un ángulo de 90° para trasladarse de un lado del tubo al otro, sin encontrar obstáculo alguno á su paso.

El vapor de la Calandria elavora bajo las mismas circunstancias favorables. La Calandria no necesita hacerse más grande que la sección de la entrada del vapor; en consecuencia, la caída por la presión no es tan considerable como en otros sistemas. Al mismo tiempo, el vapor queda desde luego dividido en pequeñas corrientes al entrar á la Calandria y se mueve con rapidez considerable. Como los tubos quedan cruzados se verifica una contínua mezcla del vapor mientras que el agua condensada, los gases y el aire pueden escapar fácilmente, mientras el vapor está dando su calor á los tubos. Es evidente que este sistema facilita el arreglo de la mayor superficie posible por calentar en el más corto espacio. En este sistema no existen superficies perjudiales.

III. Trabajo del Evaporador "Express".

El licor, para ser evaporado, entra en los tanques de succión provistos de cerraduras automáticas de válvulas. Por medio de grifones graduados se le lleva á los receptáculos que se mantienen á un constante nivel. El vapor entra á la Calandria del primer cuerpo después de que previamente se le ha librado del aceite por el "Separador de aceite", y en seguida se le mantiene á la misma constante presión requerida para trabajar el sistema entero de un modo completamente automático. El "regulador de vapor" es ciertamente un regulador, no una válvula de reducción, vulgarmente hablando, y regula á la extensión de 1/100 de atmósfera exactamente. El agua condensada escapa por una amplia pipa á una trampa enteramente moderna. El gas (amoniaco) es llevado como de costumbre al condensador. Todos los cuerpos están provistos de vasijas de seguridad efectiva. El licor condensado pasa al "Regulador de Densidad de Sirope", y es arrastrado automáticamente siempre á la misma densidad por medio de una bomba.

En virtud de la fuerte circulación **los tubos se mantienen siempre perfectamente limpios,** y el "Evaporador Express" en esta línea no tiene superior entre los evaporadores de cualquier sistema. Como los tubos están hechos de bronce, comunican rápidamente el calor á causa de su cortedad y limpieza en ambos lados. Ninguna cantidad de agua condensada ó de aceite se adhiere á lo largo de los tubos, ni ocasiona superficies evaporantes muertas: se escurre desde luego dejando la superficie por calentar más efectiva.



El vapor generado se lleva de un cuerpo á otro por fuertes bombas de Calandria, todas las secciones están cuidadosamente calculadas y amplias para dar libre escape á los vapores. El vapor del último cuerpo se condensa en un moderno condensador de "contra-corriente", y el aire es extraído por una bomba neumática de superior construcción no dejando espacios muertos, y obteniendo el mayor vacío posible.

El sistema calefactor entero puede, en caso ofrecido, limpiarse fácilmente, volteando la concha un 90% ó removiéndola al quitar dos junturas y sacándola del cuerpo completamente.

Como á todos los tubos se les mantiene siempre cubiertos con licor, no puede ocurrir deterioro alguno, como sucede más ó menos frecuentemente con los evaporadores de velo, ó con los sistemas que trabajan con tubos descubiertos. Este punto es muy importante para las fábricas de azúcar que trabajan con puras soluciones.

Reasumiendo: La sencillez del sistema entero que no tiene rival entre las construcciones nuevas ó antiguas, en combinacción con la enorme capacidad para trabajar efectuada,—lo que jamás se había hecho antes—sin ningunos medios artificiales de circulación, autoriza para calificar el "Evaporador Express", así como al "Filtro Standard", para filtración mecánica, como digno de usarse en todos aquellos lugares en que una evaporación eficaz es de importancia vital.

IV. Certificados de Fabricas que Usan el "Evaporador Express".

Muchos millares de metros cuadrados ó 10,000 de piés cuadrados de superficie por calentar tienen ahora en uso el "Evaporador Express" y han sobrepasado las esperanzas de todos los expertos. Los siguientes extractos de testimonios prueban este hecho:

Azucarerías de Säbisdorf.

21 de Enero de 1901.

La capacidad de nuestros trabajos ha aumentado considerablemente por el nuevo "Evaporador Express". Nos complacemos en manifestar que **nuestras esperanzas se han realizado con exceso** en cuanto á la prontitud del trabajo hecho.

Azucarerías de Waizenroda.

11 de Diciembre de 1901.

Estamos extraordinariamente satisfechos y los efectos del sistema "Express" son sorprendentes. **No resultaron incrustaciones y la capacidad del sistema permanece predominante é inalterable.**

Azucarerías de Guhrau.

11 de Diciembre de 1901.

El sistema ha tenido un gran éxito desde un principio. La evaporación es tan rápida que tenemos que dar salida al vapor.

Azucarerías de Wiesmar.

6 de Enero de 1902.

Estamos enteramente **satisfechos con los resultados** obtenidos.

Azucarerías de Langenweddingen.

16 de Diciembre de 1901.

Tenemos gusto en certificar que los "Evaporadores Express" trabajan muy bien, y nos **han dejado enteramente satisfechos** hasta hoy.

Azucarerías de Kras-nejabuga.

2 de Diciembre de 1900.

"El Evaporador Express" nos **ha dejado completamente satisfechos.**

Azucarerías de Hadmersleben.

31 de Enero de 1901.

Estamos extraordinariamente satisfechos con la ejecutada por el "Evaporador Express". Tenemos gusto en comunicar á Ud. que las superficies caloriferas **permanecen enteramente libres de incrustaciones** á causa de la rápida circulación del jugo. Podemos, pues, recomendar el "Express" para todos los casos de calefacción y evaporación, y muy sinceramente á todas las fábricas de azúcar.

Azucarerías de Olchowicwe.

14 de Diciembre de 1900.

El "Evaporador Express" ha trabajado sin rival durante toda la cosecha, y **cuando concluyó el trabaio los tubos estaban completamente limpios.** En cuanto al rápido paso del calor, tenenemos que felicitar á Ud. muy de veras.

Azucarerías de Balakleja.

11 de Diciembre de 1900.

Tenemos mucho gusto en certificar que **la obra hecha por el "Evaporador Express" excedió á nuestras esperanzas.** La ebullición fué mucho màs rápida que antes.

Azucarerías de Gorodock.

9 de Noviembre de 1900.

El "Evaporador Express" produjo una ebullición muy enérgica y á la vez muy pareja, y á pesar de la más intensa evaporación, el nivel del jugo permanece lo mismo. **Ninguna cantidad de licor se desparrama.** Nosotros apreciamos el haber montado el "Evaporador Express" como el asunto más ventajoso y que más ha recompensado el trabajo.

Azucarería de Sablino.

1º de Noviembre de 1900.

No fué necesario hacer la limpia de los tubos del "Evaporador Express". Todo esto prueba que no pudimos haber hecho cosa mejor que adoptar el sistema.

Azucarerías de Zbobrowtze.

La ebullición en el "Evaporador Express" fué muy igual, y aun cuando hemos estado trabajando contínuamente **durante tres meses, no se ha cecesitado hacer la limpia de los tubos,** aun cuando siempre hemos estado concentrando el licor á la altura de 35 Beaumé.

V. Lista de fabricas que servirse del "Evaporador Express".

Ingenios y Refinerias de Azúcar:

Wismar	Sablino	Kaluik
Guhrau	Zbobrowitze	Sob
Säbischdorf	Bobrowize	Nowo Tawolschansk
Weizenroda	Lugau	Nikolaew
Friedrichsaue	Saliwanschino	Saliwonki
Langenweddingen	Bala	Sosnowice
Hadmersleben	Uze	Kujaono
Salzwedel	Fröbeln	Gorodissche
Krasncjabuga	Puschkowa	Paratiewka
Olchowiec	De Mark	Rschawa.
Blakleja	Guiremant	
Gorodok	Grebenki	

Los Filtros de arena Standard de Geo. Stade en México.

La siguiente carta ha sido escrita por el Sr. D. G. P. Anderton, ingeniero, quien instaló el ingenio del General Frisbie en su hacienda de Atlixtac (Guerrero) y es una prueba más del valor de dichos filtros:

Nueva York, Marzo 29 de 1902.

Sr. D. GEO. STADE, Berlin.

Muy señor mío:

En contestación á su pregunta referente al trabajo hecho con los Filtros de Arena Standard en el ingenio de azúcar que instalé por cuenta del Gral. Frisbie en la ciudad de México, y que se llama "Hacienda Atlixtac" situada en el Estado de Guerrero, tengo mucho gusto en decirle que los DOS FILTROS QUE COMPRÉ DE Ud. HAN DADO RESULTADOS MUY SATISFACTORIOS EN TODO CONCEPTO, y que estoy pensando hacer varias otras instalaciones de sus Filtros de Arena en la República de México. Es posible con **estos filtros evitar absolutatamente inversión,** que no es el caso con los Filtros de saco, y es posible vaciar uno, limpiarlo completamente, y volver á llenarlo en 20 minutos. Es tan sencillo en su construcción, que cualquiera operario con inteligencia ordinaria, puede aprender á manejarlo con algunas horas de práctica.

Soy de Ud. afmo. y S. S. Firmado,

G. P. ANDERTON,

Ingeniero Azucarero, 120 Liberty Street, New York.

The Java Process

yielding first Sugar only and final refuse molasses
in one boiling operation
in about 48 hours
no second and third sugars — no more reboilings — no more storage tanks — the simplest process based on the crystallisation in movement principle combining highest yield, efficiency and cleanliness with lowest working expenses.

Calculation showing its economy
List of sugar works having adopted it
Extract from certificates of success in working.

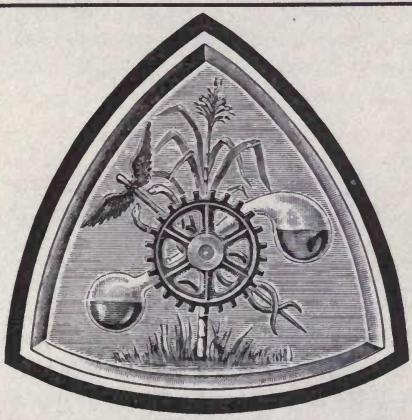
GEO. STADE,

Civil-Engineer & Technical Chemist,

Expert in Sugar & Spirit Manufacture & Refining,

Formerly Member of the Imperial Patent Office (Berlin); Correspondent of all leading Sugar Journals; Technical Adviser and Director of Sugar Works, Distilleries, and Experimental Stations.

Memb. Assoc. G. Engineers; Fellow G. Chemical Society; Memb. Union Sugar Technologists.



Technical Departments for Sugar Works & Distilleries etc.
(Established 1888-formerly Geo. Stade & Co.): —

I: Cane & Beet Sugar Machinery.
II: Rum Distilleries - Spirit Refineries.
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Address for Correspondence: "GEO. STADE, BERLIN: C. 2."

Registered Cable Address: **"Geostades Berlin".**

Code used: A. B. C., 4th Edition.

Introduction: —

The practical experiences gained during the last few years in the most modern sugar houses working with up to-date machinery, have led to the fact generally acknowledged by all experts that the making of low-products (i. e. second and third sugars from the runnings or molasses-sugar as it is termed in some countries) is not only usually a financial draw-back, but also leads to a considerable loss in sugar. The object of a modern progressive mode of manufacture, is therefore to construct sugar houses where:

First sugar and completely exhausted final refuse Molasses are made in one operation only.

The apparatus and processes introduced by Dr. Bock, Huch, Manoury and others, all endeavour to produce this result (more or less successfully). The cane-sugar industry is moreover greatly interested in the attainment of this end. Here to a greater degree than is the case with beet, the contents of Glycose and acids are as a rule extremely high and cause, without exception, serious losses in crystallisable sugar by reboiling and manufacturing low-products Scientific researches having clearly proved, that the most indifferent sugar-boiler cannot close his eyes to the advantages of making first sugar only if a high class refined raw sugar is demanded.

For some time the working with masse-cuites has been brought to great perfection in Java and all modern sugar houses there, are now making "first sugar and final molasses in one operation".

This success is chiefly due to the results attained by the eminent Sugar Expert Dr. H. Winter and his assistants and collaborators as is well know from the "Archief voor de Java Suikerindustrie". Dr. Winter has been working out his process, for 10 years, continuously making improvements and simplifying the same until it has reached the perfection and high Standard of the present-day, yielding completely exhausted molasses with a purity as low as 28 to 32%.

Our firm have great pleasure in acquainting our friends and the Sugar Industry generally, after Dr. Winter, this well known authority on cane-sugar matters, left Java, we succeeded in securing the services of the learned doctor as consulting expert for exploiting the newest improvements in his process "First Sugar and Refuse Molasses" i. e. "The Java Process". Dr. H. Winter has placed his long years of experience in this most successful process entirely at our disposal and now superintends the construction of all our machinery, gives working instructions as well as the various important details necessary for "The Java Process".

Description of machinery required: —

We can therefore guarantee, to any Sugar Factory the same splendid results generally obtained in Java if the machinery we recommend is erected with proper superintendence and our directions strictly followed. In order to get the same excellent results as in Java, the vital point on which everything depends is of course successive cooperation of all stages of the Process in the sugar-house, from the filtered juice-tanks down to the molasses separating reservoirs. Generally speaking the machinery required is not novel—but the accessories and devicesin connection with this machinery are of great importance and we cannot therefore undertake any guarantee unless our working instructions are strictly followed. In this connection it may be stated:

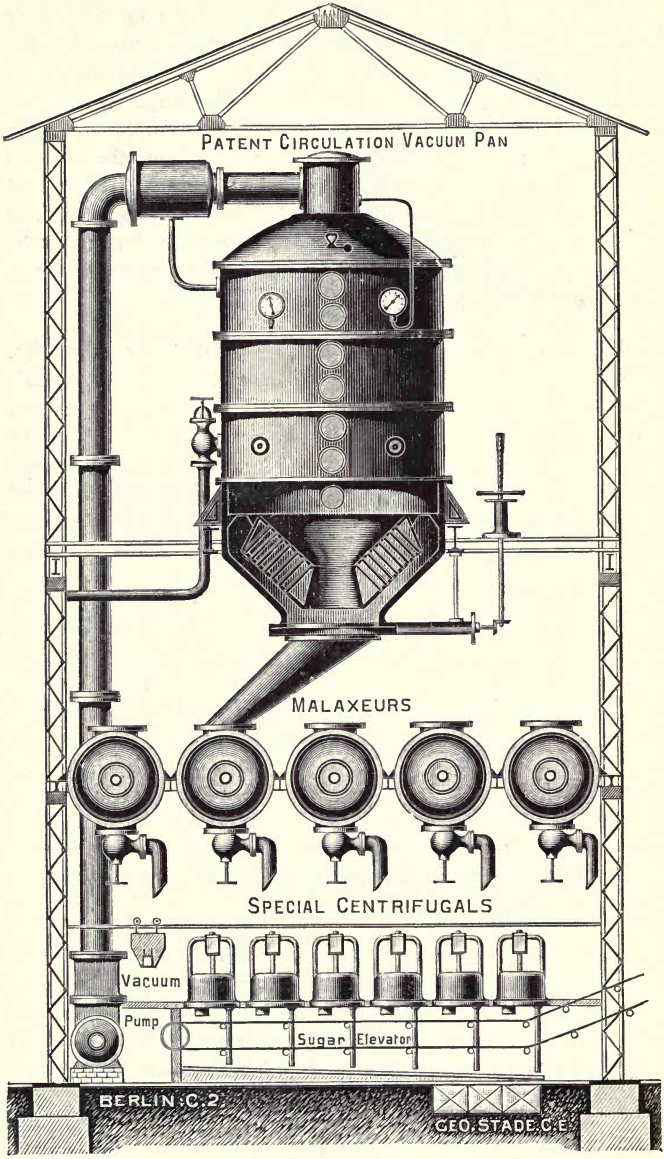
1. The Syrup or concentrated juice should be of the purest quality, no suspended matter which may surround the growing crystals (separating saccharose-crystal and mother liquor) may be present in the boiling liquor A rapid and free crystallisation is the essential feature on which everything depends and especially the exhaustion of the molasses. A series of "Standard Sand Filters" is, therefore, necessary to make the liquor as bright and clear as practicable. This can be effected without inversion by means of sand only.

2. The boiling liquor circulates in a Vacuum pan of special construction fitted with Dr. Winter's patent Injection system for syrup, steam and air. The heating surface and the capacity of the pan must be properly proportioned and the syrup introduced must be especially prepared.

3. The cooling down of the masse-cuite and the complete exhaustion take place in malaxeurs of special construction. **The complete exhaustion of the mother-lye** (the molasses) **occupies about 35 hours including the time used for boiling in the pan.**

4. The centrifugals are so designed that there is no difficulty in separating crystals and molasses. Masse-cuites yielding syrup of less than 30 % purity can be readily treated whilst for high class sugars, provision is made to avoid an eventual washing of the sugar having any influence on the resulting low purity of the molasses.

5. A special system for the classification of the runnings is also required i. e. a system of tanks the contents of which are under continuous control of the chemist, who carefully supervises the results of all previous oparations.


PATENT CIRCULATION VACUUM PAN
MALAXEURS
SPECIAL CENTRIFUGALS
Vacuum
Pump
Sugar Elevator
BERLIN C.2.
GEO. STADE C.E.

Advantages of "The Java Process": —

The important advantages obtained by the process "First Sugar and final Molasses" are obvious to any Sugar Refiner, and are as follows:

1. A considerable saving in wages,
2. Clean and convenient operation in the whole sugar department,
3. Despensing with all storage tanks for second and third masse-cuite,
4. Considerable simplification of the whole plant,
5. No chemical losses by inversion,
6. No mechanical losses, no waste in tanks, gutters and pipes.

The chief advantage however of "The Java Process", from a financial point of view is the **higher prices realized obtained for the sugar sold.** By comparing the work done with and without the Java Process in two Sugar houses, the results obtained will speak for themselves: While personally introducing his process in the Sugar Works: Bogokidoel (Kediri) and in Poh-Djedjer (Soerabaia) and superintending the work done there the following clearances were made by Dr. Winter: — (For all details see Archief voor die Java Suikerindustrie, Volume V, page 23.)

Usine Bogokidoel: —

In the crop of 1896 with the old process — per 100 tons obtainable sugar, the yield of commercial Sugar was valued at £ 756.

In the crop of 1897 — with "THE JAVA PROCESS" the yield amounted to £ 832.

This means on the total crop of 4400 tons obtainable sugar: —

a clearance of £ 3300 or $ 16558

Usine Poh-Djedjer: —

Made at the same time on a crop of 4700 tons sugar

a clearance of £ 3400 or $

This surplus was obtained although both the above mentioned factories were working previous to 1897 with the best known systems, the most intelligent superintendence and full chemical control.

Calculation: —

In order to enable the Sugar manufacturer to calculate for his particular requirement how much profit may be gained in a sugar factory by adopting the improved methods of working down the masse-cuite in one operation, the following schedule has been drawn up. The local figures, must of course be substituted to give the corresponding favorably financial results for the respective locality.

Comparison of Plants: —

For a 70000 metric tons Sugar House (700 tons per day).

A. OLD PROCESS.

Closed mixers and tank-system combined: —

Ground Floor Plan

Old system Low Product Sugar House

working with storage tanks
700 tons Raw Material per day
Scale = 1 : 400.

The complete estimate for a comparatively new "Low Product Sugar House" is given as follows:

1 Vacuum Pan
1 Condenser
1 Vacuum Pump
2 Malaxeurs
4 Centrifugals
1 Vacuum Pan
1 Condenser
1 Vacuum Pump
1 Masse-Cuite Pump
3 Centrifugals
1 Pug-Mill
6 Closed Malaxeurs
18 Storage Tanks of 1000 tons capacity, Piping, Gutters, Sluices, Shafting etc.

To this should be added the staging and the complete building covering more or less **500** square meters = **5400** sq. ft.

B. JAVA PROCESS SYSTEM.

Complete Arrangement of modern sugar house for Low Products:

New
Java Process Plan
as above 700 tons.
Scale = 1 : 400.

This embodies:

2 Patent Pans
1 Condenser
2 Vacuum Pump
4 Standard Filter and clarifying tanks
5 Malaxeurs
12 Centrifugals, Shafting etc. and Molasses seperating tanks.

To this has to be added the staging and the complete building — but this to **cover only $^1/_5$ of the old plant** i. e. **112** Square meters = **1200** sq. ft.

Per 1000 tons of First Masse-Cuite

at a polarisation of say 82 %.

I. Old Process

worked according to the most modern methods with storage tanks. (See Geo Stade, "On the Working of a Cane Sugar Factory and Refinery", the Sugar Cane, Vol. XXII, page 131), will yield: —

First sugar: 60 % from 1000 tons Masse-Cuite I = 600 tons at £ 10 or $ 48,7 = £ 6000 or $ 29220.

Second sugar: 33 % from 360 tons Masse-Cuite II = 118,8 tons at £ 8 or $ 39,0 = £ 950 or $ 4633.

Third sugar: 22 % from 217 tons Masse-Cuite III = 47,7 tons at £ 7 or $ 34,0 = £ 334 or $ 1622.

Total: 766,5 = tons £ 7284 or $ 35475.

II. "The Java Process"

making first sugar of 96,5 % Polarisation only: —

First sugar minimum 80 % from 1000 tons Masse-Cuite at £ 10 or $ 48,7 = **£ 8000 or $ 38960.**

Net Profit per 1000 tons of Masse-Cuite = £ 716 or $ 3487 in favor of "The Java Process".

For an average size factory **grinding say 50,000 tons Canes** and yielding say 15 % first masse-cuite or say 7500 tons masse-cuite per crop this means: —

1. **A profit in sugar alone of about £ 5370 or $ 26,152.**
2. **To this should be added** a. Saving in labor
   b. Saving in Fuel
   c. Saving in Interest.

Specifications and special estimates to intending Purchasers of machinery for "The Java Process" will be supplied on as soon as the essential figures to base the calculation of profit, together with other necessary details, are forwarded to us.

Certificates: —

In a report before us, the Director of the Poerwoasri Sugar Usine (a small factory only) regrets that he had not adopted Dr. Winter's Process before and certifies that in this case Poerwoasri (though its crop is only a small one) would have made Fl. 30000 or £ 2500 = $ 12175 more profit.

The success of Dr Winter's Java Process being generally admitted by all Sugar Experts, it may be sufficient here to draw the attention of interested parties to a paper of one of the most eminent practical manufacturers in Java. Mr. S. A. Arendsen-Hein, Managing Director and Superintendent of several sugar usines, in

discussing (Archief voor die Java Suikerindustrie, Volume VI, page 1145/48). Dr. Winter's Process "Sugar and Molasses" says: —

" . . . . there cannot be the slightest doubt that this process " is the **most striking improvement** which has been effected " during the last 15 years in the sugar industry".

" . . . . it remains an undisputed fact that the general " acceptance of this process is due chiefly to the full confidence " which the manufacturers have in the results obtained and " published by Dr. H. Winter, his name being a guarantee to us " for the success of the process. We did not therefore hesitate " to incur the heavy expenses of the new installation as we " were convinced that the money invested therein would pay " handsome interest".

" . . . . Dr. Winter succeeded in separating first sugar, and " exhausted final molasses in one single operation, this is a result " which up to-date has **not been obtained anywhere else** — " **not even in the most advanced European beet sugar " factory.**

" . . . . **This result is so remarkable that it should " be printed in gold letters** in the annals of our cane-sugar " industry."

A report from a Hawaiian Sugar factory working also with Standard Sand Filters and crystallisation in motion, on Dr. Winter's system says: —

" So far I am convinced, in the course of a very few years, " all up-to-date plantations will have crystallization in motion.

" This system yielded: 78,49 % of No. 1 sugar . . . . 96,92 " polarization. To summarise: —

" 1. It is a rapid process, a few days after the crushing was com- " pleted at the mill. all of the sugar was out of the mill.

" 2. There is no re-melting.

" 3. There is no labor in transfer from the vacuum pan to the " centrifugals.

" 4. There are on sticky coolers nor fermenting molasses cisterns " and their attendant inconveniences.

" It should not be overlooked that the above work was accompli- " shed, during the first season, of a new mill, with all its attendant " drawbacks, from mixed juices of an average purity of less than " 83 per cent. Our sugar boiler from Java, states that in Java the " purity, of the waste molasses was never more, and often less, " than 35 per cent in those factories which used crystallisation in " motion, according to Dr. Winter's system."

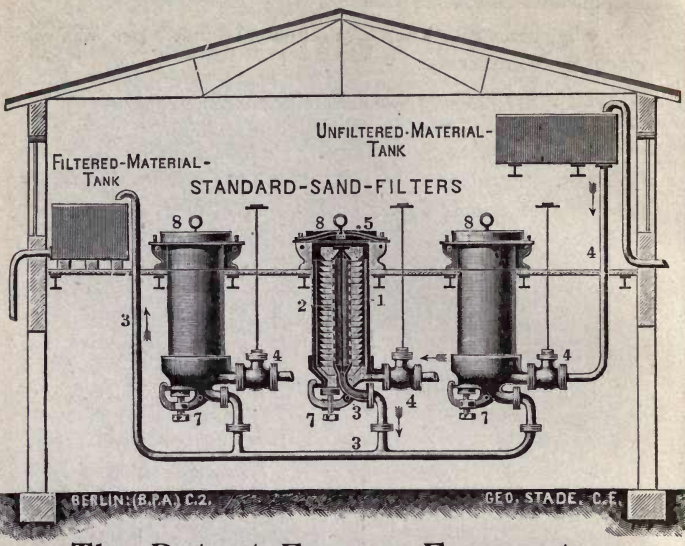
List of Sugar Works

having accepted "The Java Process" under Dr. Winter's personal superintendence: —

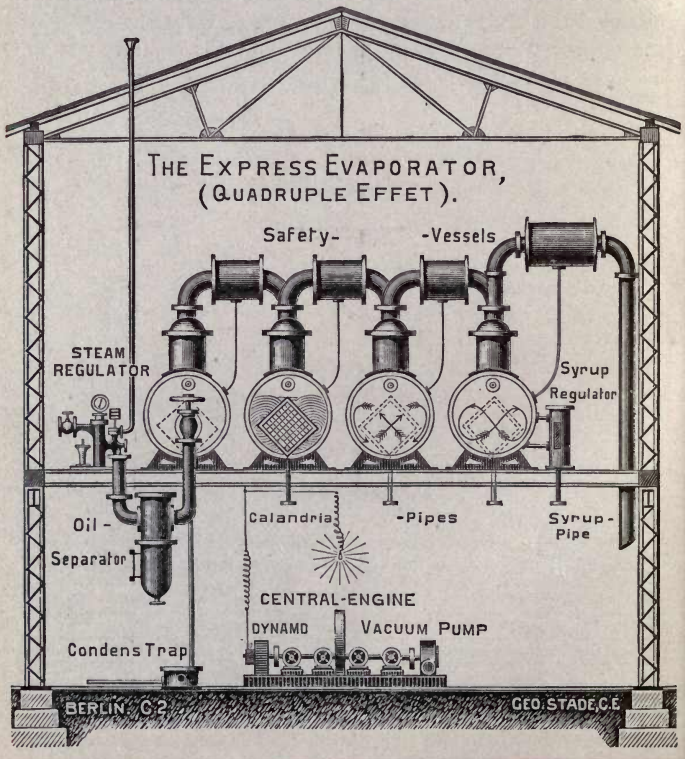
Bogohkidoel,	suikerfabriek,	Kediri.
Poh-djedjer,	„	Soerabia.
Soekoredjo,	„	Pasoeroean.
Pandji,	„	Besoeki.
Tandjong Sarie,	„	Besoeki.
Krian,	„	Soerabia.
Wonoredjo,	„	Pasoeroean.
Sentanen-lor,	„	Soerabia.
Seroeni,	„	Soerabia.
Pagottan,	„	Madioen.
Wonoredjo,	„	Pasoeroean.
Bodjong,	„	Banjoemas.
Menang,	„	Kediri.
Soember Redjo,	„	Pasoeroean.
Minggiran,	„	Kediri.
Soemberdadie,	„	Kediri.

In consequence of the splendid results obtained in the above pioneer Sugar works all modern Java sugar plantations have now adopted Dr. Winter's System and are working more or less on the basis of his directions.

The Patent Standard Sand Filter.



The Patent Express Evaporator.



The Standard-Process

for

Granulating Low Products in about sixty hours

as arranged in modern sugar houses

Calculations showing its economy;

List of sugar works having adopted it;

Extract from certificates of success in working;

Prices for complete Low Product Plants.

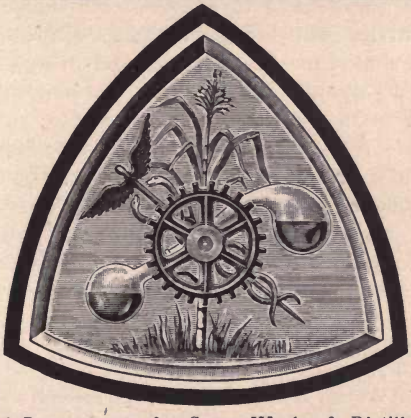
GEO. STADE,

Civil-Engineer & Technical Chemist,

Expert in Sugar & Spirit Manufacture & Refining,

Formerly Member of the Imperial Patent Office (Berlin); Correspondent of all leading Sugar Journals; Technical Adviser and Director of Sugar Works, Distilleries, and Experimental Stations.

Memb. Assoc. G. Engineers; Fellow G. Chemical Society; Memb. Union Sugar Technologists.



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Registered Cable Address: **"Geostades Berlin".**

Code used: A. B. C., 4th Edition.

Introduction: —

Since the introduction ot the diffusion and maceration processes, the substitution of mechanical filtration for the use of char in factories and refineries, and the establishment of multiple evaporation, no processes have been of more importance for the beet and cane sugar industries generally than the new systems of boiling to coarse grain the runnings from the first sugars, &c.

It is evident that the simplicity and the great advantages of these processes in doing away with all reservoirs, crystallisation tanks, masse-cuite pumps, gutters, and pipes, as well as the extensive buildings for storing, during from two to six months, the second and third masse-cuites, is leading to the adoption of these systems in the near future by all modern works. Besides, nothing can be cleaner than the working off of the low products in the same manner as the first sugar.

Different Systems: —

There are different ways of obtainig—without storage tanks—all the sugar in the masse-cuites, as far as that is possible by means of crystallization: —

I. The Java Process* (Dr. H. Winters system & patents) is guaranteed to give — if our instructions are properly carried out — one product i.e. first sugar only and final exhausted refuse molasses in one operation. This our own system we do not recommend if sugars of special quality (such as white sugar or Demerara crystals) are required. For refinery best class qualities, such as Cuba and Java crystals of 96/97% plarization, however, our **Dr. Winters system is the only one which will soon be accepted by all modern cane & beet factories in near future as it is the** right way in the only possible direction to construct sugar-houses on

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* Our firm has much pleasure to notify our friends and the sugar industry generally, that the well known authority in cane-sugar matters, Dr. H. Winter, having left Java, we succeeded to secure the services of the learned doctor as consulting expert for the newest improvements in his process "First Sugar and Refuse Molasses" i. e. "The Java Process".

Dr. H. Winter puts all his extensive 15 years experience in this most successful process at our disposal and controls now the construction of all our machinery, our working instructions and all the various & important details for "The Java Process".

Further particulars, estimates & plans on demand. Enquiries and correspondence of our friends, of intending purchasers and interested parties are respectfully solicited.

the simplest basis, combining at the same time **highest yield, efficiency and cleanliness with lowest working expenses.**

II. Some Systems boil down the syrups in the ordinary vacuum-pan and transfer the masse-cuite afterwards into malaxeurs (with or without continuous action) for granulation. Five to fifteen days at least are required for finishing.

III. The Standard Process (last, not least) granulates the syrup-molasses in a specially constructed vacuum-pan and simply finishes — *in the very same pan* — down to exhaustion of the refuse-molasses. The cooling and storing away is practised for economical reasons in malaxeurs.

Success of The Standard Process: —

There is now no further uncertainty about the success of these operations, since it has been practically *proved by over 100 sugar usines working this season without reservoirs* and yielding, a far superior sugar to the old seconds and thirds. It may now be considered as certain that any quality of normal crystallisable molasses can be grained directly in the Standard vacuums without difficulty. After about three days all sugars are ready for bagging, and the refuse molasses can then go at once to the distillery or "sucraterie", &c. This, of course, means **cash at once for these products, and saves interest, expenses, and labour.** As soon as the season is over, the mechanics can go ahead with the repairs; there are no more boilers to be fired, no more centrifugals and engines to be attended to.

For the refineries, on the other hand, it means also a considerable simplification of the whole system, only a few products being necessary, while in former days six to seven were quite usual.*

Quality of Sugar and Molasses: —

The sugar itself is generally admitted "to be as good as anything that could be desired or hoped for from syrup molasses." In the case of cane factories the enormous loss by inversion is also saved,** and the molasses can be worked out under 35% purity this means they are far better worked out than with the tank storage system.

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* *Vide* Geo Stade, "On the Working of a Sugar Refinery", *The Sugar Cane,* 1885, page 13.

** *Vide* E. Riffard, "Inversion and Loss in Cane Sugar Manufacture", *The Sugar Cane,* 1893, page 343.

Practical Factory Results: —

The following figures are given by one of the leading factories which has adopted the Standard system. They are communicated by the proprietors officially: —

Saccharose in Raw material: — .. = 14·71 % on beets.

I. Product obtained .. = 12·16 % „ (of 95·58% polarization).
Coarse-grained low products .. .. .. = 1·44 % „ (of 90·50% „).

Total sugars .. .. = 13·60 % „
Molasses .. .. .. = 1·85 % „ (of 47·40% „).

Practical extraction: —
per 100 tons saccharose .. .. .. = 92·4 tons in commercial sugars.

Chemical extraction: —
per 100 tons saccharose raw material .. = 87·9 tons saccharose commercial sugars.

Losses on saccharose (I.) % raw material: —
(1) in manufacture = 0·91 %
(2) in molasses .. = 0·88 %

Total saccharose not extracted .. .. .. = 1·79 %

(II.) % saccharose raw material: —
(1) in manufacture = 6·2 % of the saccharose in the raw material.
(2) in molasses .. = 5·9 % „ „ „ „ „

Total saccharose not extracted .. .. .. = 12·1 % „ „ „ „ „

---

100 tons total commercial sugar .. .. = 10·6 tons low products.
100 tons I. sugar .. = 11·8 „ „ „

The Working of the Standard System: —

THE STANDARD PROCESS is based on the principle of boiling to grain — directly in the special vacuum-pan — low class syrups or runnings from first masse-cuites of raw sugar works. This boiling process is continued in movement long enough to extract all theoretically possibly obtainable saccharose from the mother-liquor surrounding the formed crystals. The heating surface required for this purpose is comparatively speaking rather small, as the temperature is kept very low and decreases constantly as the boiling operation continues in order to evaporate slowly and regularly — keeping the mother-liquor always on the point of saturation while carefully avoiding supersaturation.

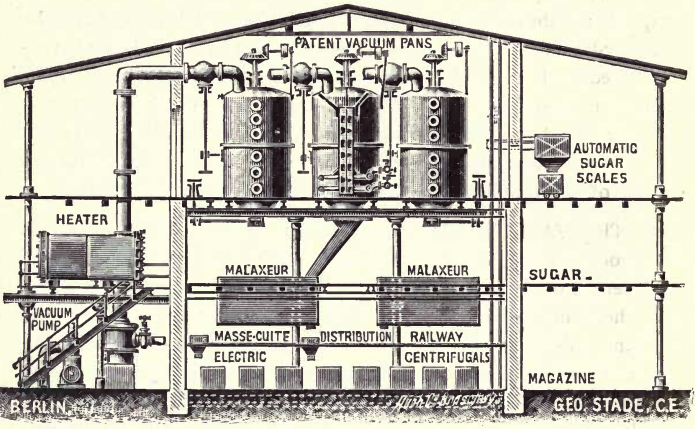
THE VACUUM PANS are constructed in such a manner as to produce a high head or column of liquid in which a considerable difference of temperature exists between the upper part (close to the vacuum-vapour pipe) and the lower part (where the heating coils are). In the centre of the pan is a wide circulation pipe, in which a specially constructed helix conveys the masse-cuite from the lower and hotter portion up into the upper and colder portions of the same. By this means an evaporative and a cooling action is produced by constant movement of the masses which results in a considerable acceleration of the crystallization.

IN OPERATING the pan is as usual first filled with the runnings of the first masse-cuites (or refinery syrups as the case may be) and granulated by drawing in cold portions of the runnings. As soon as sufficient grain has been formed the pan is duly filled up to the top. The movement sets in by means of the circulation pipe, and is continued in the malaxeurs as long as is necessary for cooling down the molasses. To determine this point of complete exhaustion, a small portion of the masse-cuite is cured (by means of an experimental centrifugal as a rule) and the runnings are analysed. When the desired purity of the final-molasses is obtained, the masse-cuite is discharged and treated is indicated below.

TO CONTROL THE BOILING of low products (as well as refined and raw sugars) the "Brasmoscope" has been found here, as everywhere, to be very useful. This ingenious cheap little instrument always indicates to perfection by a combined reading of temperature and vacuum the right point of concentration for the boiling-masses (this valuable implement exercises a complete check over the pans and the fact is recognised by over 500 factories & refineries).

A Modern Sugar House

working with the Standard System as arranged for a 700 ton Factory — with no storage tanks.



Description of the above Plant:

The second syrup (the runnings from the first masse-cuites) is granulated in the Patent Vacuum Pan — crystallization in movement system — and the resulting coarse grain masse-cuites are cooled down in the malaxeurs underneath. From the malaxeur the duly prepared masse-cuite is discharged by means of gauged waggons into the electrically driven centrifugals. The dry sugar, almost equal in appearance to first product, is carried up and weighed in automatic registering and bagging scales. The air-pump, connected in this case with a heater for raw juice, provides the necessary vacuum for the three pans. The refuse-molasses which are practically completely exhausted, as no more sugar can be obtained from them by reboiling, are collected and drawn into galvanized iron barrels for sale three days after starting the campaign.

Calculation:

showing the working extra profit of the Standard-Process compared with the old system.

A. OLD PROCESS WITH TANK STORAGE: —

A raw sugar factory produced:

a. in crop time . . . . . 259.150 metric tons Low Products
b. after crop . . . . . 220.000 „ „ „ „
Total Low Products 479.150 „ „ „ „

Further items are given as follows: —

The expenses after crop amount to £ 352 or $ 1707.20
The final molasses had a quotient of purity of: 63%
The runnings from first masse-cuite had a quotient of 72%
The sugars made (second & third jet) polarized (average) 91%
These sugars had an average quotient of purity of. . . . 94%

The yield of sugar (second et third) per 100 second masse-cuite was 26.4%, which agrees with the practical formula of Dr. Claassen.

B. STANDARD PROCESS WITHOUT ANY TANK STORAGE: —

With the new System the above factory now obtains a completely exhausted final-molasses of 60% quotient of purity and the yield in sugar is under otherwise equal conditions of manufacture

= 19.3 % higher. =

There are now coarse-grain sugars 92.300 tons more; say the price of this sugar — though of far superior quality to the old fine-grain seconds & thirds — be put down at lowest possible quotation 7 s. 6 d. per cwt or 1.8 cent per lbs still this additional yield represents . . . . . £ 692:5:- or $ 3322.80.
To this additional value has also
to be added the amount of expenses
(sub A) for the work done after crop
which is dispensed with altogether say . . £ 352:-:- or $ 1707.20

Remains as total amount cleared £ 1044:5:- or $ 5030.00

As the plant for above mentioned factory
costs about £ 2500 or $ 12128 — this saving means:

= an interest on capital invested of 41% =

not taking into account any possible value of the reservoirs, masse-cuite pumps, gutters etc. of the old system dispensed with.

Comparison of Estimates: —

For a 70000 metric tons Sugar House (700 tons per day).

A. OLD PROCESS.

Closed mixers and tank-system combined: —

Ground Floor Plan

Old system Low Product Sugar House

working with storage tanks
700 tons Raw Material per day
Scale = 1 : 400.

The complete estimate for a comparatively new "Low Product Sugar House" is given as follows:

1 Vacuum Pan
1 Condenser
1 Vacuum Pump
1 Masse-Cuite Pump
3 Centrifugals
1 Pug-Mill
6 Closed Malaxeurs
18 Storage Tanks of 1000 tons capacity, Piping, Gutters, Sluices, Shafting etc.

including packing and delivery f. o. b. = £ 4200 or $ gold 20370

To this has to be added the staging and the complete building covering more or less **400** square meters = **4300** sq. ft.

B. STANDARD SYSTEM.

Complete Arrangement of modern sugar house for Low Products:

New
Standard System Plan
as above 700 tons.
Scale = 1 : 400.

Here are required: **3 Patent Pans**
1 Vacuum Pump
1 Malaxeur
4 Centrifugals, Shafting etc.

including packing and delivery f. o. b. = £ 3418 or $ gold 16682.

To this has to be added the staging and the complete building — but this to **cover only 1/4 of the old plant** i. e. **112** Square meters = **1200** sq. ft.

Not counting now the advantage of the smaller building surface in favor of the New System, this means a difference in the original investment of £ 782 or $ gold 3688

or 23% less capital required for the Standard Process.

Extract of Certificates about the Standard Process.

Director JOHN KETTLER, Opalenitza (Posen),
the manager of one of the largest factories of the world, states in an interview: —

" The Process is working to perfection and **I can recommend it sincerely**
" **to all factories — for new works particularly it is the only modern**
" **arrangement.** Opalenitza, 2. December 1898.

Dr. EDMUND O. VON LIPPMANN, Halle (Saxony),
the well known authority on sugar matters commenced his speach about this process as follows: —

" I can declare that **all I heard and saw myself personally of the Process**
" **impressed me very favourably** about this process.
Halle Assoc. Sugar Manufacturers, 15. December 1898.

Councellor A. STRANDES, proprietor (of the Elsnigk Factory),
an director Dr. John Pini of Schladen sum up the advantages of the process as follows: —

" 1. great economy in labour,
" 2. large saving of fuel
" 3. simplicity in the sugar-house—no more reservoirs, as all tank work and
" storage-rooms for low products are entirely dispensed with.
" This process has been working in Elsnigk **from the beginning of the**
" **crop to the end without any trouble and gave great satisfaction.**
Brunswick-Hanover Assoc., 17. December 1898.

Director EMIL KARLSON, Guty-Charkow (Russia),
making granulated and extracting molasses at the same time, says in a technical essay: —

" With this Process we receive now without any diffleulty (starting with a
" quotient of purity of 80 % runnings of 56 % to 59 % purity (equal to 30
" to 35 % for cane-molasses). This is remarkably satisfying as "de facto"
" we extract directly what is technically termed "final molasses".
" **The Process besides allows extract of a maximum of what sugar**
" **could possibly be expected** under given circumstances.
" The Process gave in the first year of its existance such remarkable
" results generally speaking that **the sugar industry is justified to expect**
" **great benefit of it for the future.** Centralblatt, February 1899.

Proprietor ANDRÉ MACHEREZ, Matigny-Somme (France),
compairing the old tank-storage work with the New System says: —

" Under equal conditions **the results are always in favor of the new**
" **Process** — the yield is regular and can be determined in advance — while
" the rendement by reboiling into tanks is always uncertain and fluctuating.
Assoc. des chimistes de sucr., July 1899.

Mr. JAMES P. MUIR, Silvertown-London (England),
Director of Messrs. Henry Tate & Sons, Ltd., well known large "Thames Sugar Refinery" expresses himself as follows, having been working with the Process for some month: —

" **There is no doubt as to its complete success.**
London, E., 10. August 1899.

Report from U. S. A.

The results of the pans were quite satisfactory. We succeeded in always getting the purity down belon 60° (35° for Cane) and as low as 54° (28° for Cane).
" Our work was fully as good as any of the reports you sent us and they
" **came fully up to all claims as to their practicabillity and efficiency.**
28. January 1901.

Director WERNEKING of the Düren Sugar Factory says: —

" I shall have much pleasure to show to every body the arrangements of
" the Process here. Our figures obtained this crop with the pans are open
" to full inspection and the work done here is so satisfactory that it should
" cause every sugar manufacturer to go in for it. 13. January 1901.

Sugar Refinery KLETTENDORF: —

" **Having thoroughly tried the one apparatus we had last crop we**
" **to-day contracted for 3 more pans as the process gives full satisfaction.**
10. January 1901.

Sugar Refinery KLETTENDORF: —

3 more pans contracted for in March 1902.

Engineer FÖLSCHE said at the Anhalt Association in Bernburg: —

" A certain slow movement is preferable as the small crystals come in " this way in contact continuously with fresh sugar solution and consequently " the growing of the small grain is considerably increased.

" This is proved by the excellent result obtained in working with the " process as it is a registered fact in the sugar works of Sandersleben and " Elsnigk. 8. January 1901,

List (incomplete) of Sugar Works which have adopted Processes for granulating second sugars: —

Raw Sugar Factories:

Germany:
Düren
Opalenitza
Brieg
Oschersleben
Tschauchelwitz
Elsnigk
Sandersleben
Greifenberg
Wierschoslawice
Ketzin
Salzwedel
Scheune

Russia:
Schebekino
Brodeskoje
Obodewka
Trostjanetz-P.
Guty
Spikow
Pogrebiche
Ouditch
Grenowka
Grepienionkowka
Leubiagie
Lopandin
Dengowowka
Koretz
Trostjanetz-Ch.
Smuskoi-St.
Monastyrzyska
Kernasowska
Turbow

Holland:
Naarden
Zeevenbergen
Breda
Bergen-op-Zoom

France:
Vénizel
Etrépagny

Belgium:
Landen
Wanze
Genappe

Denmark:
Marimo

Sweden:
Helsingborg
Jordberga

Italy:
Bologna

Spain:
Aranjuez etc. etc.
Madrid
(4 in construction)

Austria-Hungaria:
Selyp
Bütz
Altbrünn
Hawran

Java:
Sugar Works Gemoe-Semarang

Chile:
Refineria Vina del Mar

Refineries:

Holland:
Western Suiker R.
Spakler & Tetterode

Russia:
Petersburg R.
Trostjanetz-R.

Germany:
Fröbeln
Klettendorf
Sandersleben Gr.
Oschersleben R.

England:
Henry Tate & Sons, Ltd. etc. etc.

United States:
E. H. Dyer & Co. Cleveland Ohio.

Sweden:
Arlöf

List of Sugar Works having accepted **"The Java Process"** under Dr. H. Winter's personal superintendence, making "First Sugar & Final exhausted Molasses" in one operation, no second and third sugars, and no more reboilings at all: —

Bogohkidoel,	suikerfabriek,	Kediri	Seroeni,	suikerfabriek,	Soerabaia
Poh-Djedjer,	„	Soerabaia	Pagottan,	„	Madioen
Soekoredjo,	„	Pasoeroean	Wonoredjo.	„	Pasoeroean
Pandji,	„	Besoeki	Bodjong,	„	Banjoemas
Tandjong Sarie,	„	Besoeki	Menang,	„	Kediri
Krian,	„	Soerabaia	Soember Redjo,	„	Pasoeroean
Wonoredjo,	„	Pasoeroean	Minggiran,	„	Kediri
Sentanen-lor,	„	Soerabaia	Soemberdadie,	„	Kediri.

" In consequence of the splendid results obtained in above mentioned " pioneer sugar works all modern Java sugar plantations have accepted now " Dr. Winter's system and are working more or less after his prescriptions.

Prices for Modern Low Product Sugar-House Machinery.

Guaranteed to give with the Standard Process — without reservoirs — exhausted molasses & choice quality sugar within about 60 hours.

Pos	Code words for pos. 3, 4, 5 = 6		Cul.	Cur.	Culver.	Culo.	Cullyis.	Culma.	Culpa.	Culbri.	Cultive.	Cumber	Gode words
1	Capacity of Factory in tons Raw Mat (Beet or Cane) Basis: 100 tons Raw Mat. = 5 t. second Masse Cuites		100	200	300	400	500	600	700	800	900	1000	—
2	Contents of one Vacuum Pan in tons Masse Cuite		20	20	25	20	25	30	35	40	45	50	—
3	**Patent Vacuums** with fittings, brasmoscope, pulleys etc.	£	593	1186	1298	1778	1948	2034	2120	2289	2459	3052	finch
		$ gold	2894	5788	6334	8677	9506	9926	10346	11170	12000	14894	
		metr. tons	10.0	20.0	22.0	30.0	33.0	36.0	39.0	42.0	45.0	56.0	
4	**Vacuum Pump** with condenser & connections	£	249	249	273	249	273	333	359	404	525	404	frog
		$ gold	1215	1215	1333	1215	1333	1625	1752	1971	2563	1971	
		metr. tons	4.8	4.8	5.3	4.8	5.3	7.0	7.3	10.0	13.2	10.0	
5	**Malaxeur** with worm & pulleys	£	138	138	165	138	165	187	214	228	242	228	rag
		$ gold	673	673	806	673	806	912	1045	1118	1181	1113	
		metr. tons	4.9	4.9	6.2	4.9	6.2	7.1	8.2	8.8	9.2	8.8	
6	Total Pos. 3, 4, 5	£	980	1573	1736	2165	2387	2554	2693	2921	3226	3684	Bull
		$ gold	4782	7676	8473	10565	11645	12463	13143	14254	15744	17978	
		metr. tons	19.7	29.7	33.5	39.7	44.5	50.1	54.5	60.8	67.4	74.8	
7	**Centrifugals** with motor & complete shafting etc.	£	463	463	604	463	604	627	725	759	885	985	tront
		$ gold	2260	2260	2948	2260	2948	3060	3539	3704	4319	4807	
		metr. tons	11.2	11.2	14.2	11.2	14.2	15.8	18.6	19.6	23.0	26.0	
8	Grand Total Pos. 6, 7	£	1443	2036	2340	2628	2991	3181	3418	3680	4111	4669	rush
		$ gold	7042	9936	11421	12825	14593	15523	16682	17958	20063	22875	
		metr. tons	30.9	40.9	47.7	50.9	58.7	65.9	73.1	80.5	90.4	100,8	

All Prices include packing and delivery f. o. b.
Quotations are subject to the fluctuations of the market.

Terms: Half on ordering, balance on delivery. (Complete buildings with roofing, staging & elevators, belting etc., to be supplied to order at cheapest rates.)

BERLIN: C. 2.

GEO. STADE.

Geo. Stade, Civil-Engineer, **Berlin: C. 2.**

Technical Departments for Sugar Works & Distilleries, etc.

I: CANE & BEET SUGAR MACHINERY of any capacity; construction & reconstruction of Beet & Cane-Sugar works; Modern Refineries with or without charcoal; Boiler Houses for bagasse or coal; Boiler Feed Pumps for boiling hot water. Arrangements of sugar houses with Patent Pans yielding within 12 to 72 hours (according to quality required) in one or two products all commercial sugar complete from masse-cuites and refuse-molasses — no more tanks, consequently great economy in labour and fuel, absolute cleanliness. Electrically, water-driven Centrifugals. Boilers, Engines & Pumps for all purposes of highest efficiency. Mechanical Filters, Superheated clarification; Bagasse-Furnaces; Evaporating Pans of newest type. Own Patents & System for extracting sugar from canes; Centralisation of all Machinery with electric motion; Automatic Lubrication; Cane Factories working without other fuel than Bagasse. Granulators for white sugar, etc.

II: RUM DISTILLERIES — SPIRIT REFINERIES. Own System & Patent for fermenting molasses; ventilated fermenting rooms-highest yield possible; Automatic Stills & Rectifiers with Fusel Oil separation. Central Pumping Engines.

III: STORES; FITTINGS; IMPLEMENTS: Railway material; steam-ploughs; complete work shop arrangements; Boiler-Fittings, Cocks & Valves (never leaking ones a speciality). Compositions for steam-pipe covering; Lighting arrangements of buildings (electric, acetylene, gas); India Rubber; Durit packing & hose (superior to asbestos & rubber, per cwt. £ 22 = $ 107); Registering instruments i. e. — Thermometers (£ 12 = $ 58) — Pressure Gauges (£ 7 = $ 34). Control meters for liquids (£ 30 = $ 146); Brasmoscopes for exact boilings of masse-cuites (£ 9 = $ 44); Experimental Centrifugals for steam, electricity & hand (£ 5 to 26 = $ 25 to 126); Experimental Filter-Presses (£ 6 = $ 30); Automatic registering scales for Sugar (bag filling & sewing), Liquids, Beets etc. (from £ 23 = $ 112); Automatic lubricating pumps (£ 5 = $ 25). Steam Regulators — no reducing valves — guaranteed thoroughly reliable (from £ 5 to 50 = $ 25 to 243). Manures & chemicals at wholesale prices.

IV: LABORATORIES; INSTRUMENTS; ANALYSES: Complete installations i.e.:

A: (Code word "Liebig") to suit the wants of small Factories . . . . . £ 30 = $ 146 — f. o. b.
B: (Code word "Howard") for control of large sugar works . . . . . £ 65 = $ 316 — f. o. b.
C: (Code word "Pasteur") for Central Factories with Distilleries . . . . . £ 85 = $ 413 — f. o. b.
D: (Code word "Robert") with implements for soil & manure analysis . . . . . £ 125 = $ 607 — f. o. b.

Special combinations promptly attended to.

Standard Polariscopes (special make for all climates)

£ 20 = $ 97 f. o. b.

New Patent Polariscopes . . (from £ 8 to 50 = $ 39 to 243);
Microscopes . . . . . (from £ 5 to 100 = $ 25 to 485);
Chemical & technical Balances (from £ 5 to 50 = $ 25 to 243);
Ice machinery for laboratories (from £ 15 to 50 = $ 73 to 243);
Beet disintegrators . . . . (from £ 5 = $ 25);
Meteorological Instruments . (from £ 10 = $ 49);

V: REPORTS; CONSULTATIONS; PATENTS. Estimates for machinery and Processes for Cane & Beet Sugar Manufacture & Refining and Distilleries supplied to order at shortest notice. Patents attended to for all countries.

VI: REPRESENTATIONS; AGENCIES, temporary or permanent, undertaken for the Continent or Abroad.

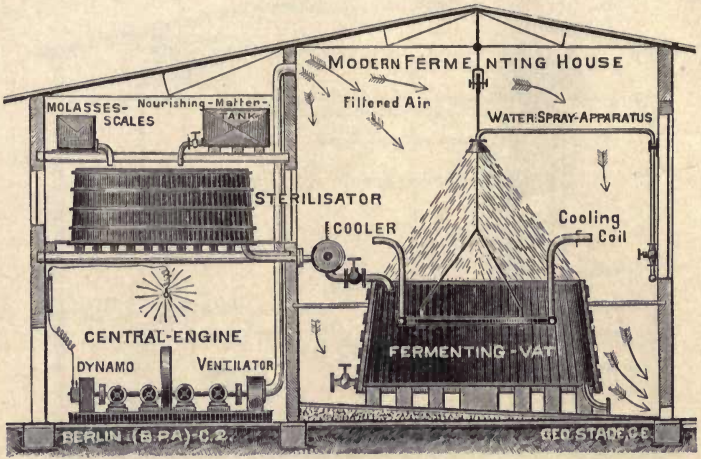
Charges:

According to tariff of "Associated G. Architects & Engineers Union", — (no commission, all discounts credited); or Special Terms. —

ENQUIRIES and CORRESPONDENCE SOLICITED.

No. 175.

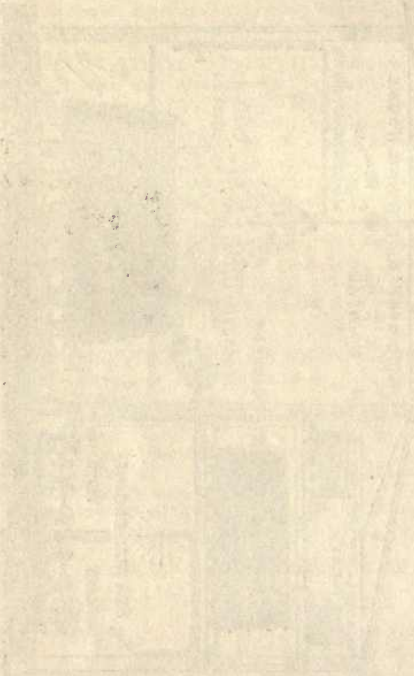
MODERN FERMENTING ROOM.



GEO. STADE

(VORM. GEO. STADE & Co.)

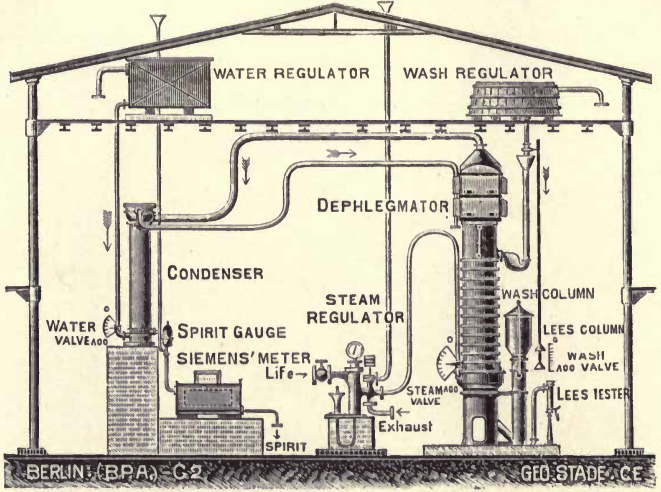
BERLIN: (B. P. A.) - C. 2.



No. 177.

MODERN STEAM STILL

(AUTOMATIC & CONTINUOUS WORKING).



BERLIN: (B. P. A.) - C. 2.

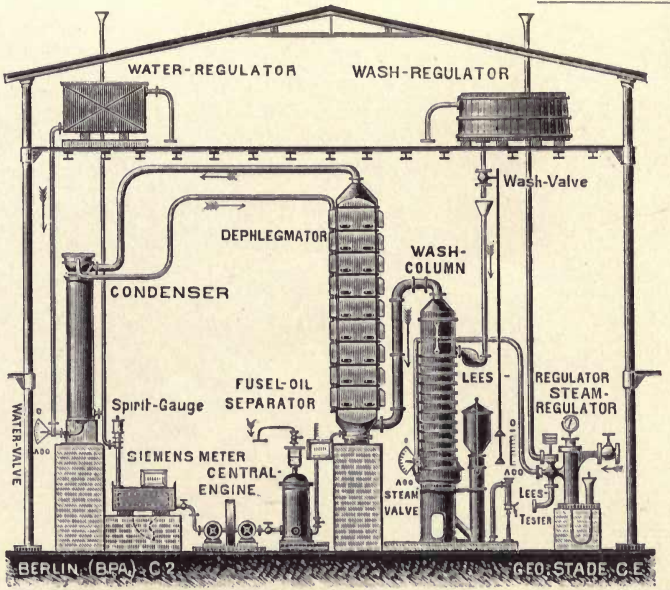
GEO. STADE

(VORM. GEO. STADE & Co.)

No. 178.

APPARATUS FOR REFINED SPIRITS,

— WITH PATENT FUSEL OIL SEPARATOR, — (AUTOMATIC & CONTINUOUS WORKING).



BERLIN: (B. P. A.) - C. 2.

GEO. STADE

(VORM. GEO. STADE & Co.)

NB. SINCE 1893 THIS REFINING PLANT IS IN CONTINUOUS USE NOW IN "THE WEST INDIA RUM REFINERY", BARBADOS, — DISTILLING THE FAMOUS "STADE'S REFINED RUM".

The

Standard Incandescent Spirit Lamp,

an economic light for factories, railways, streets, workshops, halls, offices & houses &c.,

an important development for

— spirit producing countries. —

With prices & certificates & references.

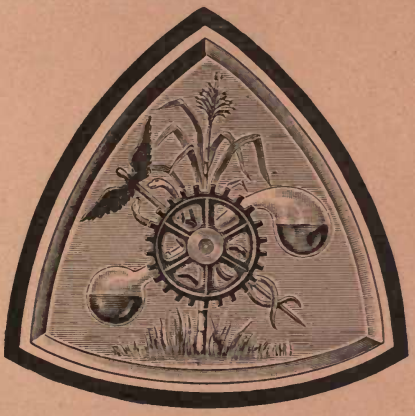
GEO. STADE,

Civil-Engineer & Technical Chemist,

Expert in Sugar & Spirit Manufacture & Refining,

Formerly Member of the Imperial Patent Office (Berlin); Correspondent of all leading Sugar Journals; Technical Adviser and Director of Sugar Works, Distilleries, and Experimental Stations.

Memb. Assoc. G. Engineers; Fellow G. Chemical Society; Memb. Union Sugar Technologists.



Technical Departments for Sugar Works & Distilleries etc.
(Established 1888 - formerly Geo. Stade & Co.): —

I: Cane & Beet Sugar Machinery.
II: Rum Distilleries - Spirit Refineries.
III: Stores - Fittings - Implements.
IV: Laboratories - Instrum. - Analyses.
V: Reports - Consultations - Patents.
VI: Representations - Agencies.

Bankers: "Deutsche Bank" Berlin (& London).

Address for Correspondence: "GEO. STADE, BERLIN: (B. P. A.) — C. 2."

Registered Cable Address: **"Geostades Berlin".**

Code used: A. B. C., 4th Edition.

The use of Alcohol for lighting purposes: —

New devices and new materials for the production of light are keeping chemists and engineers busily engaged. Besides electricity, the Auer gas-light, the acetylene and numerous other gas-lamps, and petroleum, are in use. Amongst these various modes of illumination incandescent spirit burners now take their position as the newest and most modern of the systems for carying "more light" into cottages and palaces as well as into offices, streets, and workshops.

Electric and Auer gas lights are not always obtainable, and acetylene cannot always be recommended.

The light most in use all over the world is the petroleum lamp, though the mineral oil is found in very few places, and consequently has to be imported by nearly every country. Millions of national wealth are in this way paid away, chiefly to those very few large petroleum-producing quarters.

Taking the average consumption of petroleum at only 10 kilos, or 22 lbs. per head a year, and the price at 5 cents or $2\frac{1}{2}$ d. per kilo., then this means for a community of 1,000,000 an expense of

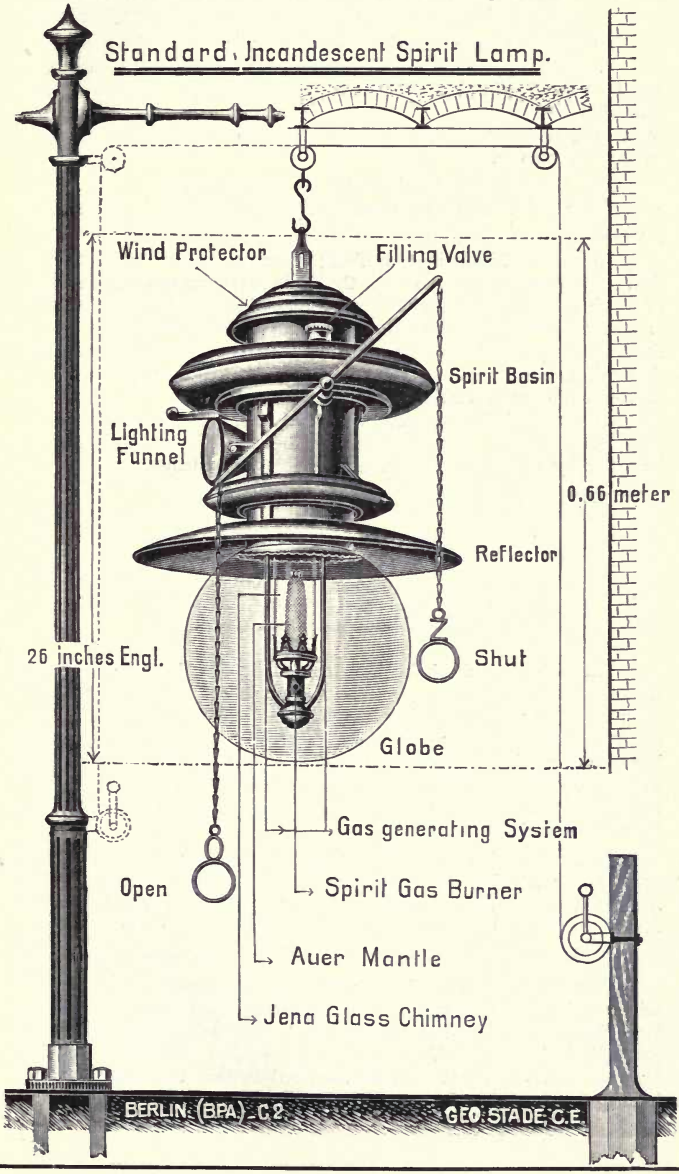
about L. St. 100,000 or say $ gold 500,000.

This money is largely put into the pockets of a few financiers commanding the oil wells. Certainly from the standpoint of national economy, therefore, it would be of the greatest importance if this outlay could be more or less saved to the country. By the invention of the incandescent spirit lamp, the expenditure for petroleum importations could be done away with. But, on the other hand, besides this, the disposal of the large quantities of spirit or "high wine" (rum as it is usually called) is of vital importance to the cane-sugar industry. Converting the final "refuse molasses" into alcohol by fermentation is almost the only way for large modern factories to get rid of their molasaes. If this refuse product is real final molasses (which means that it is giving no more sugar by re-boiling), then it is mostly without any value unless it is burned as fuel or distilled. For feeding purposes it can be used only to a very small extent.

The use of alcohol for drinking purposes is also limited, and for ethical and hygienic reasons it is highly desirable that it should remain limited. But nowadays the manufacture of spirit from final colonial molasses, sweet potatoes &c., does not pay any longer in many countries, because a ready market cannot be found to dispose of the surplus product at remunerative prices. Therefore it ought to be the duty of governments and politicians to facilitate the sale of spirit for lighting or similar purposes, and thus ensure employment for many people producing the agriculture raw products. To show that this question is well understood, it may be mentioned here that the Imperial Castle and Grounds near Berlin are now illuminated with 220 standard incandescent spirit lamps, which give full satisfaction to the authorities concerned. This fact, of course, was the reason that many railway stations and other official buildings have accepted alcohol for lighting purposes, thus giving the best certificate that this mode of lighting can be depended upon under any circumstances. The Secretary of State for Public Works recommends in the Official Railway Gazette (Vol. XXIII, No. 15) all the District Administrators to use the spirit incandescent lamp, "generally on all stations of the Prussian State Railways, where gas and electricity are not available", and the well known expert Prof. Hayduck, of the agriculture Academy of Berlin, says with regard to the lamp in the Journal for Spirit Industry (Vol. XXI, No. 26): — The spirit incandescent lamps give a sharp and nice light; they are very simple and easy to handle. No danger is possible, on account of the practical and reliable construction".

The Construction of the New Alcohol Lamp.

In devising this lamp, it soon became evident that the discovery of Auer had to be taken as a leading principle. It pointed out the way in which a useful lamp for burning spirit could be obtained and by taking full advantage of the newest ideas, the spirit lamp soon overcame the usual defects of new inventions, and its construction soon assumed a thoroughly practical shape. This can easily be judged by the following details.



The spirit is kept in a closed vessel. From this a small tube leads down to the wick or gas generator. This gas generator is made of asbestos, enclosed in brass netting, and receives the spirit in its lower parts. The pressure of the spirit in the basin continuously pushes a small quantity of spirit through the asbestos tube, which in its upper part is exposed to the heat developed by the burning spirit lamp. In the upper part of the wick the spirit is now transformed into vapour. This vapour then enters the gas tube leading down to the burner, keeping the Auer mantle at full heat, and in this manner the light is produced continuously.

To start the lamp a basin is fixed underneath the gas generator, and in opening the main cock (in order to light the lamp), a small quantity of spirit, just as much as to start the lamp, runs into this small basin. Here it is now lighted. It heats up the wick and generates and ignites the gas, which shortly afterwards enters the burner.

The lighting can be done by an ordinary match, but where a number of lamps are used a special lighting instrument is preferable.

To put out the light, nothing more is required than to pull down the arm marked Z and the light is extinguished at once. From this description it will be seen that simplicity of construction is one of the vital points of these lamps, and this is the reason that they burn for months without requiring any other attention than filling and lighting. The manupalations otherwise necessary in connection with this light are very simple also. There is only the exchange of the generators or wicks, and the renewing of the Auer mantle once after burning, say about 500 hours, and this can be done by any one without any special knowledge.

The Quality of the Spirit Required.

The spirit required for burning in the Standard Incandescent Lamp, must not contain any coarse impurities. The barrels and cans used for keeping this alcohol have to be kept clean; they must not contain oil or petroleum. Furthermore, spirits containing heavy doses of fusel oil ought not to be used. It is not necessary to use rectified alcohol (though the purer the spirit the better for the lamp), but the raw spirit must be of good quality and must have the requisite strength.

As a rule, spirit under 86 per cent Tralles, equal to 0.84 specific gravity, or 51 deg. English Over Proof, 34 deg. Cartier, or 172 American Proof, must not be used for lighting purposes. Where Methyl-Alcohol is required, it is quite sufficient to use

1 part of Methyl-Alcohol for 100 parts of spirit.

This proportion makes any spirit unpalatable. Of course, where a higher percentage of methylating ingredients is fixed by law, there is no harm in using such spirit, supposing the proper strength is kept up. Very likely, however, in this case the wicks or gas generators have to be renewed in less than 500 burning hours.

Safety Against Explosions.

The basin containing the spirit is kept perfectly closed and cool. It is connected with the generator by means of a small tube only. Consequently no danger of explosion is possible. In fact, as to safety, the Standard Spirit Lamp is not, we believe, surpassed by any other system of construction. The lamps burn without any smell or smoke. They give a steady light which can be relied upon to last without interruption as long as there is alcohol in the basin, i. e. for 24 to 30 hours.

As to the danger of explosion the "Association of the Fire Brigades" in Berlin says in their 15. yearly report: —

"The Standard Incandescent Spirit Lamp was covered inside and outside with alcohol and fire set to it. The alcohol burned with some noise, but after the evaporation was over the lamp remained in perfect good order in all its parts and could be kept burning."

Cost of lighting with Spirit.

A lamp developing 70 standard candle power is guaranteed to use in 10 hours 1 litre of spirit of 86 per cent Tralles. Taking the price of 1 litre of spirit at 6 cents or 3 d., and estimating the amount of wear & tear for mantle, wick, chimney, globe, and lamp generally at the utmost at 1 cent or $^1/_2$ d. per day, then there is spent: —

Per 10 Burning Hours.

Spirit (1 litre)	say, cents (gold)	6.0 or	3 d.
Wear & tear		1.0	$0^1/_2$ d.
	Total cost of 70 candles: —	7 cents or	$3^1/_2$ d.

Of course, it is understood that these calculations vary with the price of the alcohol. The price taken as basis cannot be considered as too low, however, as alcohol for export or for generating power (as used for spirit-motors) is selling at 5 cents per litre.

Its Various Uses.

From an economical point of view this type of lamp can therefore be recommended in all places where a safe and steady light is required, and it is **always advisable to burn some spirit lamps in the most prominent places, in factories which are as a rule lighted up by electricity.** Thus, in case of any disturbance of the electric machinery, a light is kept up under any circumstances in frequented passages, near boiling pans, in boiler houses, engine rooms, near transmission of power plants, &c., and severe accidents and much inconvenience are sometimes in this way prevented. The same holds good for factories working only at intervals, as for instance in sugar estates, where no steam is kept up after the crop work or while cleaning up. Here **spirit lamps can replace in a cheap way those expensive electric accumulators** which might otherwise eventually be necessary.

For lighting public places, churches streets, shops, stores saloons, railways, offices, and houses, &c., the spirit light is admirably adapted. But also for private rooms these lamps are used to advantage if the height of the room is sufficient to show the full strength of the light.

Extract of Certificates about the Standard Incandescent Spirit Lamp.

SUPERINTENDENT WINCHENBACH of the Podelzig Sugar Factory Says: —

" During last crop I had 6 Standard Incandescent Spirit Lamps " in constant use for lighting the factory-yard and the plantation " buildings. These lamps gave me full satisfaction.
" Where electric light is not available there I can strongly " recommend these spirit-lamps, for large yards as well as for " storage rooms and beet-houses &c.
" The lamps burnt matchless even in the heaviest storm. " The expenses in chimneys and mantles are insignificant and the " consumption in alcohol amounts to 0.025 marks per hour only."
(equal to about one farthing or half cent gold.)
20. Dec. 1900.

PROFESSOR DR. WITTELSHÖVER, said at the meeting of the Sugar Association in Magdeburg: —

" The Standard Spirit Lamp is the cheapest of all lamps as it " burns only for 0.4 Pfennigs alcohol per 10 Candles. This lamp " is in use now on many estates for lighting yards and stables, " also in dairies, sugar-factories, spirit-refineries &c. Of course, " it is necessary to keep the lamp in order to get good results, " but the same has to be done even with the most common oil- " lamp. Certainly the construction of the lamp is now so simple " that it requires far less care and less skill for keeping it going " than f. i. any gas or electric plant. 6. Nov. 1900.

List of some users of The Standard Incandescent Spirit Lamp: —

Prussian State Railway; over 10000 lamps in use consuming nearly 500000 litres of spirit.
Bavarian State Railway; the goods-station Nuernberg has alone a complete installation of 180 lamps.
Gas-Works Koenigsberg are using spirit-lamps on all places outside of the pipe system
Town of Breslau arranged all the inside boulevards with spirit-light
Gas-Works Kreuznach
Fortification Magdeburg over 100 lamps in use
Hamburg-Luebeck railway 200 lamps
Imperial Castle near Berlin 220 lamps
Town of Essen (using spirit lamps in addition to Gas)
" " Uelzen dto
" " Stralsund dto
" " Stettin dto
" " Düren dto
Sugar Factory Podelzig (see certificate)
Spirit Refinery Magdeburg
Imperial Castle Ploen
Hunting Grounds and Castle in Rominten
Sans-souci Avenue near Potsdam is completely illuminated with alcohol
The "Syndicate for Spirit Production Ltd.", Berlin, Central Office: 250 lamps in constant use.
etc. etc. etc.

Prices for Standard-Incandescent-Spirit-Lamps.

1	Code word (beginnings)		Luz	Lor	Lig	Len	Lad	Leg	Lum	Lob	Lef	Lup	Loh	(endings)
2	Number of Lamps		1	2	3	4	5	10	15	20	30	40	50	
3	Lamps with complete set of spares & implements for 12 mouth (to be fixed on hooks etc.)	£	7:-:-	12:10:-	17:19:-	23:11:-	29:4:-	57:1:-	84	112	168	224	280	ala
		$ gold	34·20	60·90	87·60	114·90	142·50	278·20	394	550	822	1094	1366	
		cubic metre	0·29	0·45	0·60	0·85	1·02	2·05	3·10	4·10	6·15	8·20	10·25	
4	Lamps with spares & implements as above and with pulleys & security winches (to be used in buildings etc.)	£	8:10:-	15:10:-	22:9:-	29:11:-	36:14:-	72:1:-	107	142	213	284	355	ero
		$ gold	41·50	78·20	109·50	144·16	179·00	351·60	524	692	1039	1385	1732	
		cubic metre	0·30	0·50	0·66	0·94	1·12	2·25	3·40	4·50	6·75	9·00	11·25	
5	Lamps with spares & implements as above, with pulleys, winches & iron stand post— to be fixed on wooden pillars etc. (to be used outside or independent of buildings)	£	9:-:-	16:10:-	25:6;-	31:11:-	39:3:-	77:1:-	114	152	228	304	380	isu
		$ gold	43·90	80·50	123·40	153·90	191·00	375·80	561	742	1112	1483	1884	
		cubic metre	0·38	0·65	0·93	1·21	1·67	3·35	5·00	6·70	10·05	13·40	16·75	

All prices include the necessary packing and delivery f. o. b.
Methyl-Alcohol for denaturation supplied at £ 7:10:- or $ 33·50 per 100 kilo
Spirit supplied at market rates (£ 9 or $ 44 per 1000 litres).
Quotations are subject to the fluctuations of the market.

Terms: Net cash against shipping documents or special terms.

BERLIN: (B. P. A.) - C. 2.

GEO. STADE.

Geo. Stade, Civil-Engineer, Berlin: (B. P. A.) - C. 2.

Technical Departments for Sugar Works & Distilleries, etc.

I: CANE & BEET SUGAR MACHINERY of any capacity; construction & reconstruction of Beet & Cane-Sugar works; Modern Refineries with or without charcoal; Boiler Houses for bagasse or coal (Freitag's coal dust firing); Boiler Feed Pumps for boiling hot water. Arrangements of sugar houses with Patent Pans yielding within 12 to 72 hours (according to quality required) in one or two products all commercial sugar complete from masse-cuites and refuse-molasses — no more tanks, consequently great economy in labour and fuel, absolute cleanliness. Electrically, water-driven & Express Centrifugals. Boilers, Engines & Pumps for all purposes of highest efficiency. Mechanical Filters, Superheated clarification; Bagasse-Furnaces; Evaporating Pans of newest type. Own Patents & System for extracting sugar from canes; Centralisation of all Machinery with electric motion; Automatic Lubrication; Cane Factories working without other fuel than Bagasse. Granulators for white sugar, etc. Express-Pumps

II: RUM DISTILLERIES — SPIRIT REFINERIES. Own System & Patent for fermenting molasses; ventilated fermenting rooms-highest yield possible; Automatic Stills & Rectifiers with Fusel Oil separation. Central Pumping Engines.

Factory built: THE WEST INDIA RUM REFINERY, BARBADOS, etc.

III: STORES; FITTINGS; IMPLEMENTS: Railway material; steam-ploughs; complete work shop arrangements; Boiler-Fittings, Cocks & Valves (never leaking ones a speciality). Compositions for steam-pipe covering; Lighting arrangements of buildings (electric, acetylene, gas); India Rubber; Durit packing & hose (superior to asbestos & rubber, per cwt. £ 22 = $ 107); Registering instruments i. e. — Thermometers (£ 12 = $ 58) — Pressure Gauges (£ 7 = $ 34). Control meters for liquids (£ 30 = $ 146); Brasmoscopes for exact boilings of masse-cuites (£ 9 = $ 44); Experimental Centrifugals for steam, electricity & hand (£ 5 to 26 = $ 25 to 126); Experimental Filter-Presses (£ 6 = $ 30); Automatic registering scales for Sugar (bag filling & sewing), Liquids, Beets etc. (from £ 23 = $ 112); Automatic lubricating pumps (£ 5 = $ 25). Steam Regulators — no reducing valves — guaranteed thoroughly reliable (from £ 5 to 50 = $ 25 to 243). Manures & chemicals at wholesale prices.

IV: LABORATORIES; INSTRUMENTS; ANALYSES: Complete installations i.e.:

A: (Code word "Liebig") to suit the wants of small Factories . . . . . £ 30 = $ 146 — f. o. b.

B: (Code word "Howard") for control of large sugar works . . . . . £ 65 = $ 316 — f. o. b.

C: (Code word "Pasteur") for Central Factories with Distilleries . . . . . £ 85 = $ 413 — f. o. b.

D: (Code word "Robert") with implements for soil & manure analysis . . . . . £ 125 = $ 607 — f. o. b.

Special combinations promptly attended to.

Reconstruction of old Polariscopes into guaranteed "Standards"
— at moderate prices —.

New Patent Polariscopes . . (from £ 8 to 50 = $ 39 to 243);
Microscopes . . . . . (from £ 5 to 100 = $ 25 to 485);
Chemical & technical Balances (from £ 5 to 50 = $ 25 to 243);
Ice machinery for laboratories (from £ 15 to 50 = $ 73 to 243);
Beet disintegrators . . . . (from £ 5 = $ 25);
Meteorological Instruments . (from £ 10 = $ 49);
Standard-Typewriters with full visible writing £ 24 = $ 117.

V: REPORTS; CONSULTATIONS; PATENTS. Estimates for machinery and Processes for Cane & Beet Sugar Manufacture & Refining and Distilleries supplied to order at shortest notice. Patents attended to for all countries.

VI: REPRESENTATIONS; AGENCIES, temporary or permanent, undertaken for the Continent or Abroad.

Charges:

According to tariff of "Associated G. Architects & Engineers Union", — (no commission, all discounts credited); or Special Terms. —

ENQUIRIES and CORRESPONDENCE SOLICITED.

EL ALCOHOL COMO MEDIO DE ALUMBRAR.

Un Desarrollo Importante Para Las Industrias de Alcohol y Azúcar de Caña.

Todos los químicos é ingenieros continuan dedicando su atención á nuevos medios y materiales para la producción de luz artificial. Además de la electricidad, se usan otros sistemas ya, como por ejemplo la luz de gas "Auer", lámparas para gas de petróleo y otros gases, y lámparas de petróleo. Entre estos varios métodos de alumbrar tenemos ahora que incluir los quemadores incandescentes de alcohol como uno de los sistemas más modernos y recientes para alumbrar no solamente cabañas y palacios, sino también oficinas, escritorios, calles, y talleres mecánicos. No es siempre posible obtener la luz de gas Auer, miéntras no puede recomendarse siempre el uso del gas de acetileno. La luz que se usa principalmente en todas partes del mundo se obtiene de la lámpara de petróleo, aunque se encuentra este aceite mineral en solamente en unos pocos lugares, de modo que ha de ser importado por casi todos los paises. De este modo se pagan millones de la riqueza nacional principalmente á aquellos pocos paises donde se produce el petróleo en cantidades importantes. Tomando el consumo medio de petróleo á 10 kilos. por persona el año solamente, y el precio á 5 cents. por kilo., se halla que el coste para una comunidad de 1,000,000 almas sará de unos $ 500,000, que van enriquezar unos pocos financieros. Consiguientemente, del punto de vista de la economia nacional, sería un beneficio de la máxima importancia para el país si fuese posible disminuir dicho desgaste más ó menos. Debido á la invención de la lámpara de alcohol incandescente, no es necesario gastar más dinero para la importación del petróleo. Pero, al contrario, además de esto la obtención de un mercado para las cantidades considerables de espiritu ó ron como en general se denomina, es un punto de importancia vital para la industria del azúcar de caña. La conversión de la "melaza final" en alcohol por medio de la fermentación, es casi el único medio que poseen los grandes ingenios modernos para aprovecharse de las melazas. Cuando este producto subsidiario es en verdad nada más que una "melaza final" (es decir que no es posible sacar más azúcar de ella por recocerla), entónces tiene casi ningun valor, á ménos que se lo destile ó se lo usa como combustible. Pona usos de alimentar es posible usarlo en grado menor solamente. El empleo del alcohol para usos de beber es limitado también y, para razones éticas é higienicas, esperamos que continuará asi limitado dicho uso. Pero hoy dia la fabricación del alcohol de melazas finas coloniales, patatas dulces, etc., etc., no se paga más en ciertos paises, porque no es posible hallar un mercado receptivo para el producto sobrante á precios remunerativos. Por consiguiente deberían los gobiernos y los politicos hacer todo lo posible para facilitar la venta del alcohol para usos de alumbrar ú otros semejantes, con el fin de dar trabajo á las muchas personas que producen los productos crudos agrícolas. Para demostrar que se comprende la importancia de esta cuestión mejor en el extranjero dirémos aquí que son iluminados ya el castillo imperial y su parque en la vecindad de Berlin con 220 lámparas incandescentes de alcohol, que dan plena satisfacción á las autoridades. Debido á este hecho muchas estaciones de ferrocarril y otros edificios oficiales han adoptado el alcohol para usos de alumbrar, dando asi la mejor prueba de la confianza que se puede poner en este sistema de iluminación en todas circumstancias. El Secretario del Estado para

Obras Públicas recomienda en la *Gaceta Oficial Ferrocarrillana* (tomo xxiii, núm. 15) á todos los administradores de los diferentes distritos el uso de la lámpara incandescente de alcohol "generalmente en todas las estaciones de los ferrocarriles del estado prusiano, donde no sea disponible ni el gas ni la electricidad." Además, el afamado perito, Prof. Hayduck de la Academia Agricola de Berlin, dice con referencia á dicha lámpara en el órgano de la industria de espiritu (tomo xxi, num. 26): — "Las lámparas incandescentes de alcohol dan una luz clara y agradable; son muy sencillas y fáciles de manipular. No hay posibilidad alguna de peligro, debido á la construcción prática y segura."

La Construcción de la Nueva Lámpara de Alcohol.

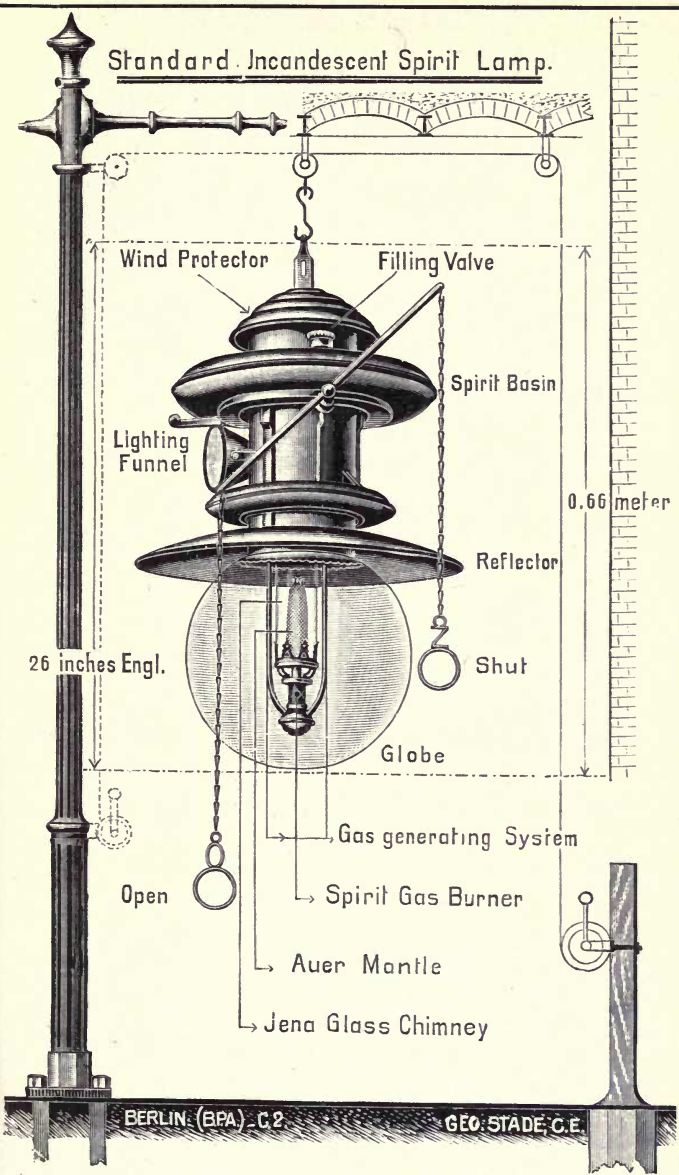
Durante el período de idear esta lámpara luego llegaba á ser evidente que debia tomarse la invención de Auer cómo el principio gobernante. Señalaba a manera de poder conseguir una lámpara servible para quemar el alcohol, y cuando se aprovechaban las nuevas ideas, lograha luego la nueva lámpara vencer todos inconvenientes acostumbrados de nuevas invenciones, y tomaba su construcción una forma práctica dentro de muy poco tiempo—hecho que puede verificarse estudiando los siguientes detalles (véase la ilustración). El alcohol se contiene en un receptáculo cerrado, del cual pasa una pequeña cantidad hasta la mecha ó generador del gas que se hace de amianto, encerrado en tela de bronce, y recibe el alcohol en su parte inferior. La presión del alcohol en el receptáculo ó bacia empuja continuamente una pequeña cantidad de alcohol por el tubo de amianto, cuya parte superior se expone al calor desarrollado por la lámpara cuando encendida. En la parte superior de la mecha se trasforma el alcohol en vapor, que entra en el tubo de gas que conduce al mechero, manteniendo al capote "Auer" completamente calentado, y de este modo se consigue una luz continua.

Para poner la lámpara en operación se fija una pequeña bacia debajo del generador de gas, y cuando se abre el grifo maestro (para encender la lámpara), se deja escapar en esta bacia una pequeña cantidad de alcohol suficiente para poner la lámpara en acción. Entónces se enciende este alcohol que calienta la mecha generando y encendiendo el gas que, poeo tiémpo después, entra en el quemador. Para encender la lámpara se usan los fosforos ordinarios, pero cuando hay varias lámparar es preferible usar un aparato de encender especial.

Para apagar la luz es solamente necesario tirar hácia abajo el brazo Z cuando se apaga la luz inmediatamente. De esta descriptión se verá que constituye la sencillez de su construcción uno de los puntos más prominentes de estas lámparas, y á esta razón se debe el hecho que arden durante muchos meses sin requerir ninguna atención salvo llenar y encenderlas. Las demas manipulaciones necesarias son también muy sencillas. Hay solamente el cambio de los generadores ó mechas, y la renovación del capote "Auer" después de un uso de (digamos) 500 horas—operaciones que no requieren pericia alguna.

La calidad del alcohol requerido.

El alcohol requerido para la lampara incandescente modelo "Standard" ha de ser libre de todas impurezas. Los barriles y latas usados para almacenar este alcohol deben mantenerse perfectamente limpios; no deben contener ningun aceite ni petróleo. Además de esto no deben usarse alcoholes con altos por cientos de oxido hidratado de amila. No es necesario usar alcohol rectificado



(aunque cuanto más puro el alcohol tanto mejor será para la lámpara), pero tiene el alcohol crudo que ser de buena calidad y de la fuerza necesaria. En general no debe usarse para usos de alumbrar un alcohol de ménos de 86 por ciento Tralles=0·84 gravedad especifica ó 34⁰ Cartier. Por donde se requiera alcohol metilado, basta usar 1 parte de dicho alcohol con 100 partes de espiritu—proporcion que hace desabrido el alcohol de toda clase. Naturalmente, cuando prescribe la ley un porciento más alto de ingredientes metilados no hay ningun obstáculo enusar tal espiritu, provisto siempre que

se mantenga la potencia necesaria; pero en este caso es muy probable que habrá de renovarse las mechas ó generadores de gas en ménos de 500 horas de uso efectivo.

Seguridad contra Esplosiones.

La bacia que contiene el alcohol se mantiene perfectamente cerrada y en estado frio, communica con el generador por medio de un pequeño tubo solo consiguientemente no hay posibilidad alguna de esplosiones. En verdad, bajo el concepto de seguridad, no tiene rival la lámpara de alcohol „Standard" en ningun otro sistema de construcción. Las lámparas arden sin olor ni humo, dando una luz uniforme y no vacilante que dura miéntras que haya alcohol en la bacia, es decir desde 24 hasta 30 horas. En cuanto al peligro de esplosión, dice la Junta de Bomberos de Berlin en su 50mo. informe anual: — "La lámpara incandescente de alcohol modelo 'Standard' ha sido cubierta de alcohol al interior y al exterior y entónces ha sido encendida. El alcohol se quemaba con algun ruido pero, cuando ha cesado la evaporación quedaba la lámpara en estado perfectamente bueno en todas sus partes, de modo que se continuaba á usarla."

Coste de alumbrar con Alcohol.

Una lámpara desarrollando una luz de 70 bujias normales de potencia se garantiza usar en diez horas 1 litro de alcohol de 86 % Tralles. Calculando el precio de 1 litro de alcohol al precio de 6 cent. ó 3 peniques,—y estimando 1 cent. ó $1/2$ penique por dia para la deterioración del capote, mecha, chimenea, globo, y la lampara misma—se gasta

Por diez horas de luz.

Alcohol (1 litro) digamos	cent (oro)	6·0 ó	3 pen.
Deterioración	„ „	1·0 ó $1/2$	„
Coste total de 70 bujias de potencia	„ „	7·0 ó $3 1/2$	pen

Naturalmente se entiende que varian estos calculos según el precio del alcohol; pero el precio escogido para nuestra base no puede considerarse como demasiado bajo, porque el alcohol para generar potencia (es decir para motores de espiritu) se vende en la actualidad á $2 1/2$ pen. por litro.

Sus usos Diferentes.

Del punto de vista económico, sonsiguientemente, podemos recomendar esta lámpara para uso en todos los lugares donde se requiere una luz segura y no vacilante, y es siempre prudente usar algunas lámparas de espiritu en los puntos más prominentes de fabricas que en general son alumbradas por la electricidad; cuando, llevándose á cabo alguna interrupción de la maquinaria electrica, hay siempre una luz continua en los pasajes más frecuentados, en la vecindad de pailas herridoras, en cuartos de calderas, en cuartos de maquinaria, en la vecindad de planteaje para la trasmisión de la fuerza, &c., &c., de modo que se evitan inconvenientes y siniestros muy graves. Las mismas observaciones pueden aplicarse á cuantas fabricas trabajen solamente á intervalos, cómo por ejemplo en el caso de ingenios donde no se emplea el vapor después de tratar la cosecha. En tales casos llegan á ser las lámparas de alcohol un sustituto barato para los acumuladores eléctricos, costosos. Son también especialmente á propósito para alumbrar lugares públicos, calles, tiendas, salones, ferrocarriles, oficinas, residencias, &c., &c., sin hablar de cuartos particulares, provisto que sea suficiente su altura para mostrar la potencia entera de la luz.

THE

Patent-Standard-Polariscope

the most modern instrument on the market

for:—**Sugar Laboratories, Experimental Stations, commercial analysis,**

also for:—**distilleries, medical researches and pharmaceutical Chemists.**—

THE

Standard-Calorimeter

the simplest and most reliable instrument for the determination of the caloric value of fuel etc. also for scientific researches—indispensable for factories, laboratories, colleges & universities—for demonstration etc.

With prices & certificates & references.

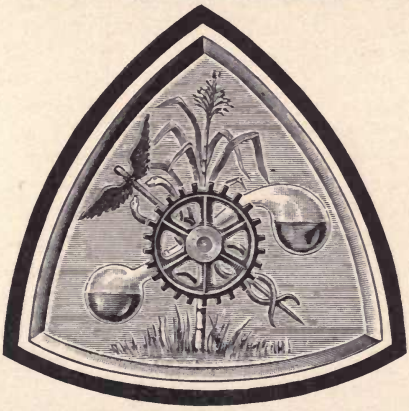
GEO. STADE,

Civil-Engineer & Technical Chemist,

Expert in Sugar & Spirit Manufacture & Refining,

Formerly Officer of the Imperial Patent Office (Berlin); Correspondent of all leading Sugar Journals; Technical Adviser and Director of Sugar Works, Distilleries, and Experimental Stations.

Memb. Assoc. G. Engineers; Fellow G. Chemical Society; Memb. Union Sugar Technologists.



Technical Departments for Sugar Works & Distilleries etc.
(Established 1888-formerly Geo. Stade & Co.): —

I: Cane & Beet Sugar Machinery.
II: Rum Distilleries - Spirit Refineries.
III: Stores - Fittings - Implements.
IV: Laboratories - Instrum. - Analyses.
V: Reports - Consultations - Patents.
VI: Representations - Agencies.

Bankers: "Deutsche Bank" Berlin (& London).

Address for Correspondence: "GEO. STADE. BERLIN: (B. P. A.) — C. 2."

Registered Cable Address: **"Geostades Berlin".**

Code used: A. B. C., 4th Edition.

General-Export-Agency
for
Julius Peters, Instrument Works, **Berlin.**

I. The Standard-Polariscope.

Introductory Remarks: —

In the present day a thorough rigorous control is exercised with regard to everything in connection with sugar, not only in the factory but also in the field, and in commercial dealings. The check maintained over the work done in sugar works and refineries extends, in well-managed concerns, to the minutest details, and even a difference of a few tenths of saccharose in the *rendement* or yield is considered to be a very serious point calling for full attention. One tenth of a per cent. more than practically necessary left in the residues such as bagasse, slices, scum or charcoal, now often gives occasion for close investigations, and steps are taken to prevent such losses as nobody thought anything of in "better days"—and so, for instance, the appearance of the "night chemist" can be accounted for! In these times of close competition the days are past when planters could afford to disregard a per cent. more or less so long as the prices were fair, and in leading agricultural circles the percentage of saccharose in the raw material (whether cane or beet) is watched anxiously enough. There is no need of calling special attention to the anxiety manifested by the commercial body at large with regard to "a few tenths", the lawsuit of the dealers in the United States against the government, now pending, on account of "small" differences in the analyses, of raw sugars, and amounting to some odd million dollars, supplies a fine object-lesson in regard to the importance of exact polarization.

Old systems: —

The property possessed by a sugar-solution of deflecting polarized rays will probably remain (for the near future at least) the only basis of all practical methods of analysis. However imperfect this basis may be in many cases, up to now the progress of chemistry has not discovered a more reliable or more suitable way since Prof. Eilhard Mitscherlich invented the first Polariscope, now nearly fifty years ago. Though the foundation principle of this method has remained the same ever since the analysis of saccharine juices commenced to play such an important part in the technical, agricultural, and commercial sugar-world, the instruments have, nevertheless, been considerably improved and brought to great perfection.

In former days the Ventzke-Soleil Polariscope (introduced mainly by Prof. Scheibler into the sugar industry) and the instruments of Laurent, not to mention some other less practical constructions, were almost exclusively used for polarizations. These instruments of Scheibler and Laurent are still found in

some places and have their drawbacks—the former, that of not being sufficiently sensitive, particularly for dark coloured solutions and for people who suffer from colour-blindness; the latter (originally constructed for scientific purposes) that of not being useable with ordinary rays, but only with special lamps burning sodium salts.

Modern Instruments:

These old constructions had to give way to the instruments made on the "half shadow principle" of Jellet-Corny, and working entirely with the rays of an ordinary lamp. The modern polariscope of this kind works with SINGLE QUARTZ-WEDGE COMPENSATION, and gives very exact readings even for persons with a defective sense of colour who are met with more frequently than is desirable, and for coloured solutions. However the division of the scale from 0^0 to 100^0 of this instrument has to be checked by standard solutions or by normal Quartz-Plates.

The instruments with DOUBLE QUARTZ-WEDGE COMPENSATION obviate this inconvenience. They have two reading scales which permit in a very easy way the accurate control of any point of the scale, without the use of other apparatus. At the same time most of these instruments permit the reading of left polarization from $\pm 0^0$ to -100^0 which is in some cases particularly useful for analysing glucose, inverted sugar, &c.

Besides these instruments with full readings of from 0^0 to 100^0, there are in use some constructed for special purposes, as for instance, the **Polariscope with limited readings of from 0^0 to 35^0,** which is very handy for analysing beets, slices, and canes, (particularly on Seed Farms, where sometimes over 1,000 polarizations are made per day). The advantages which instruments of this kind possess are, among others, that the Quartz-Wedges

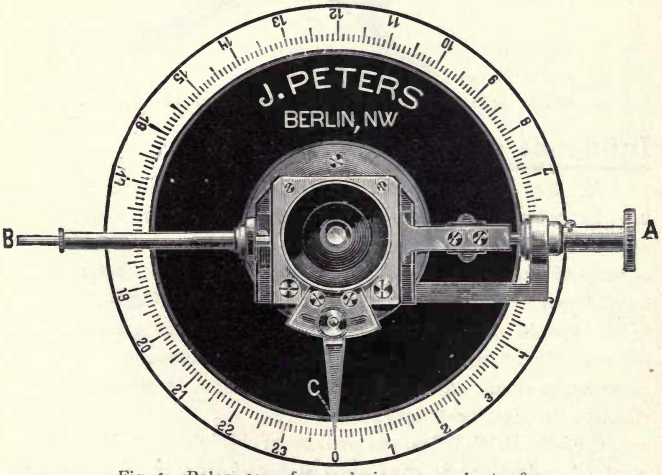


Fig. 1. Polariscope for analysing canes, beets, &c.

are very short and consequently can be made to perfection at moderate prices. Without going into theoretical details it may be mentioned, however, that a good polariscope must have absolutely faultless quartz wedges, as only $^1/_{10}$ of a millimetre difference in the thickness of a quartz plate is equivalent to a difference of $6^1/_4{}^0/_0$ sugar. This shows clearly that all plates, glass covers, nicols and crystals, have to be perfectly constructed, as the polarizing ray has to travel through about a dozen planes, and the slightest fault in any one surface renders the analysis illusory. For sugar analysis exclusively, the **Polariscope for concentrated solutions of 80° to 100°** is highly to be recommended if many analyses have to be effected, as for instance, in a refinery or in a commercial laboratory. It possesses the same practical advantages as the above mentioned polariscopes with limited reading scales.

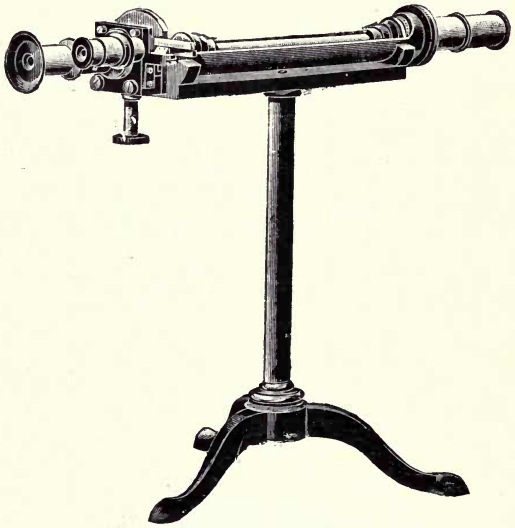


Fig. 2. Polariscope for analysing sugars and masse cuites.

Influence of temperature:—

All the above-mentioned instruments (which are made for use in temperate climates) nevertheless develope certain very disagreeable qualities as soon as the average conditions of temperature and humidity are changed. To eliminate these faults, caused by different meteorological conditions, THE STANDAND POLARISCOPE has been especially constructed, which is guaranteed to be — practically speaking — more correct under any change of temperature than any other instrument, and is available in all climates, tropical or temperate.

Prof. Dr. H. W. Wiley, the wellknown chief chemist of the Department of Agriculture of the United States of America, in his lecture:

"On the Influence of Temperature on the Rotation of Sugar Solutions in Quartz-Wedge Compensating Polariscopes" delivered in Vienna at the "International Congress for Applied Chemistry, 1898", pointed out that the influence of the temperature in hot climates is too great to be neglected. At the meeting of the foreign section of the "Union of Sugar Technologists", Professor Wiley again specified his observations. American chemists use chiefly Berlin Polariscopes adjusted at 17·5° C. The mean temperature, however, of the United States laboratories is on an average about 6° to 8° higher, for the tropies this difference would sometimes attain from 8° to 25° C. and more, and if in the United States government offices Professor Wiley already finds 0·3% lower polarisation for sugars, for most cane sugar producing countries this figure will certainly be far higher. Professor Wiley said:

"Great danger is also to be feared from pressure on the "quartz-wedges from variations in temperature. The wedges are "usually mounted in brass, and since the expansion of brass is "different from that of quartz, a pressure may be produced which "will materially change the rotating power of the compensating "wedge. It is highly important that the wedges be mounted in "such a way that a change of temperature will produce no change "in rotating power due to pressure or strain. Again, the specific "rotating power of a quartz-wedge increases with a rise of "temperature. Hence it happens that at 25° C. a less thickness "of the wedge is required to restore the rotation produced by a "sugar solution than at 17·5° C. The apparent strength of the "sugar solution is therefore diminished. Further, my investigations "have shown that the specific rotation of a sugar solution decreases "with a rising temperature; and the amount of this change has "been determined."

Professor Wiley found that with ordinary Mohre flasks, combining all factors in one expression:—

1° C. = —0.029° polarization, is to say, a solution which polarizes 100° at 17·5° C., will indicate only about 99·7% at 25° C. Further inconveniences have been pointed out by another chemist of high standing and acquainted with tropical climates, Dr. H. Winter, of Soerabaya (Java). In tropical and particularly moist climates with great variations in temperature, it was found that the "Nicols", &c., of the instruments got "cloudy," and consequently the readings were indistinct and incorrect. The newest apparatus often became useless after a short time, and had to be sent home for repair. For this reason, the Standard Polariscope has its "Nicols", &c., protected by glass plates. Besides this, all the other parts exposed to the air are made in such a way that they are unaffected by climatic influences. Moreover the "Standard" is supplied with Patent scales which are not influenced by heat and humidity in the same manner as the old ebony scales, and do not become destroyed or useless by warping.

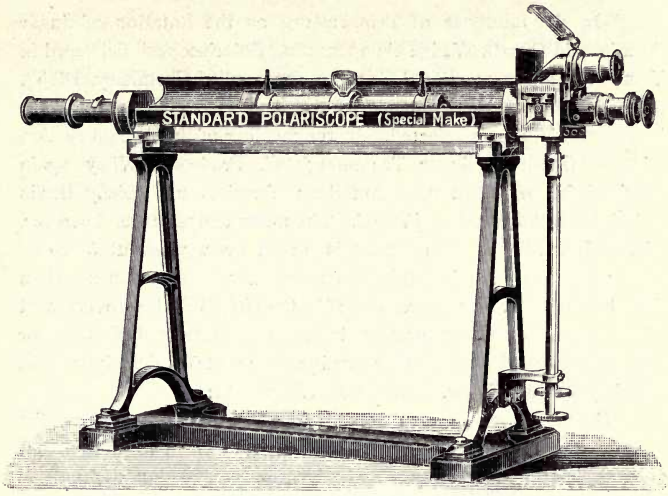


Fig. 3. Standard-Polariscope.

The advantages of the Standard

not equalled by any other more complicated or less reliable constructions are: —

1. it is the most simple in construction — consequently cannot get out of order — this is very important for places far away from repairing laboratories.
2. it is the most exact instrument—as the wedges are not mounted in brass and not exposed to pressure.
3. The scales are easily tested, all nicols, etc. are protected against the influence of temperature and humidity — consequently its wear & tear is a minimum.
4. It is mounted on a solid foundation and handy in using — it does not fatigue the eyes and allows quick work.
5. It is equal reliable with petroleum-lamps, acetylene gas, ordinary gas light, Auer-lamps or electric light—no inconvenient sodium lamps are required.*)

Control Tubes:

To control the division of the scales it is, however, always desirable (for places where absolute exactitude is necessary) to have a CONTROL OBSERVATION TUBE on the spot. These tubes are very useful, save a great deal of trouble, and enable the chemist to have the polariscope always under control without wasting much time. With the help of this invaluable little instrument, a constant watch can easily be exercised over the whole length of the scale and a security be obtained which is otherwise only possible by the constant use of many normal saccharose solutions: (Price from £ 3 = $ 14.70 = fr. 76).

*) In case of almost all old polariscopes (supposing they are otherwise in good condition and the *quartz-wedges not damaged),* it would be advisable to have them converted, according to special instructions, into Standards, as this can be effected with sufficient accuracy at a small cost.

For Medical Researches and pharmaceutical chemists:

For some purposes the approximate readings of $0 \cdot 1^{0}$ is quite sufficient practically speaking. Here can be recommended the cheap

MITCHERLICH GRADIENT INSTRUMENT

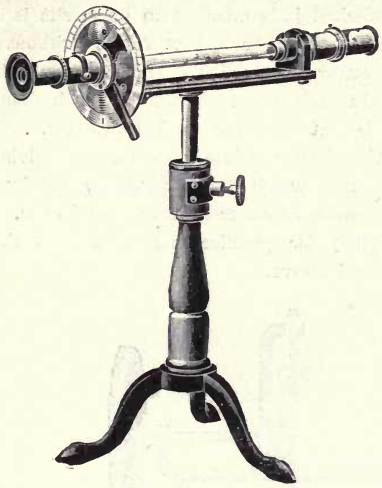


Fig. 4. Sodium Light Polariscope.

In many case the old Mitcherlich apparatus is not convenient, however, and particularly where numbers of analyses have to be made it is recommendable to use the

THE STANDARD-MEDICAL-POLARISCOPE

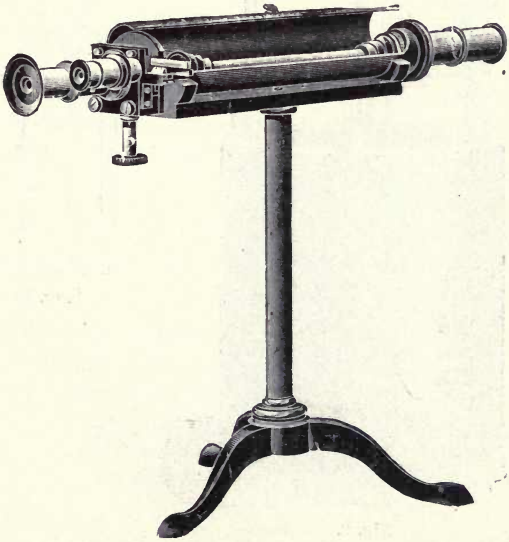


Fig. 5. Ordinary light medical Polariscope, here any lamp can be used.

II. The Standard-Calorimeter.

For the Control of the Boiler House the Standard Calorimeter is as indispensable as the Polariscope is for the control of a modern sugar house. It is evident that not knowing the caloric value of a fuel, an efficient judgement as to its merits is as impossible as it is to judge a cane or a beet variety without knowing the percentage of sugar it contains. The ordinary caloric analysis, making use of Dulong's formula, takes too much time for practical purposes and is out of place in factories, etc. . Consequently the Standard Calorimeter is the instrument — giving in a short time — exact figures which are proved to be by the highest authorities (Berthelot, Scheurer-Kestner, Meunier etc.) more reliable and more suitable for practical purposes than the elementary analysis mentioned above.

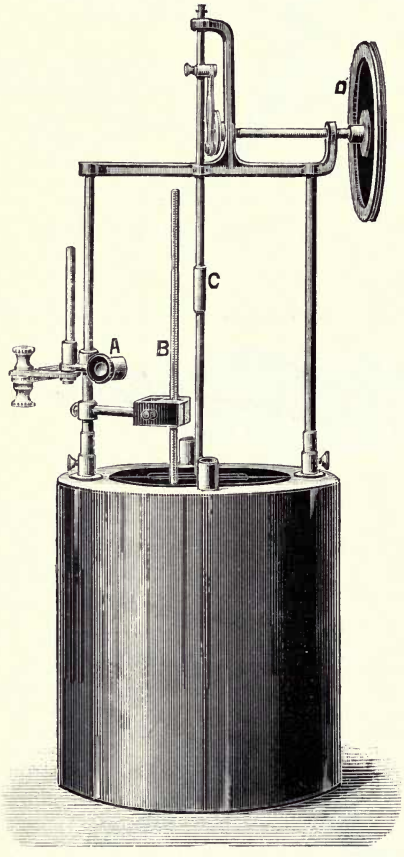


Fig. 6.

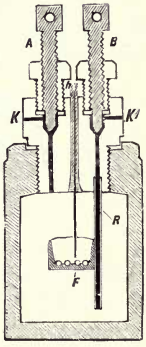


Fig. 7.

The apparatus consits of the Calorimeter (Fig. 6) with exact thermometer and the "bomb" (Fig. 7) in which the fuel is burned by means of oxygene. All that is necessary in addition to this is a chemical & technical balance, etc. as used in laboratories and the analysis can be made by any chemist.

For factories, commercial laboratories, universities, colleges, schools & experimental stations the Calorimeter can not be too highly recommended — particularly as the price of the new instrument is very moderate now — compared with less reliable and more complicated old systems working in the open air.

Extract of Certificates.

I. Standard-Polariscopes: —

THE KUKAIAU MILL CO., OF HAMAKUA-(HAWAII), writes as follows: —

. . . . . We now beg to say that we find the Instrument all that can be desired, and quite as sensitive as we expected it to be. We congratulate you on having, by the invention of this instrument, smoothed over the difficulties which chemists have to contend with, out here, in regard to getting absolutely accurate determinations. To sum up we find the Standard-Polariscope avery accurate as well as a pleasant instrument to work with.

8. March 1900.

SUGAR WORKS ONOMEA (HAWAII) write: —

„ . . . We can assure you thats your Standard-Polariscope „ proved to be an excellent instrument with regard to exact and „ easy readings. It does not fatigue the eye and surpasses all other systems we know of . . . .

DR. WIECHMANN, Brooklyn (U. S. A.)-the well known authority on sugar analysis says: —

„ . . . My examination of the Standard-Polariscope proved to „ be very satisfactory and I have to thank you for the care „ and exactitude with which you executed the order.

THE IMPERIAL COURT APOTHECARY'S DISPENSARY (Berlin) write: —

The Standard-Medical-Polariscope is made to perfection, and works very satisfactorily as to sensibility etc. and it can be recommended sincerely . . . . 17. March 1900.

II. Standard-Calorimeter: —

THE BERLIN ELECTRICITY WORKS write: —

We are very much satisfied with the Standard-Calorimeter and can recommend it sincerely for practical & technical purposes. We have executed now with the apparatus over 100 analysis and the instruments continue to work matchlessly. 2. April 1900.

List (incomplete) of factories etc. using our Standard-Instruments.

I. Polariscopes etc.

a. SUGAR. ANALYSIS etc.

Sugar Association laboratory (Berlin)
„ do. „ (Vienna)
American Sugar Refining Co.
Commercial Laboratory Telbisz (Hungaria)
Sugar Factory Erstein
„ „ Landskrona (Sweden)
„ „ Kjeflinge (Sweden)
„ „ Lebus (Russia)
„ „ Lublin (Russia)
Sugar Plantation Onomea (Hawaii)
„ „ Springlands (Demerara)
„ „ Beneva (Natal)
„ „ Kukaiau (Hawaii)
„ „ Picalongan (Java)
„ „ Semarang (Java)
Sugar Beet Seed Farm
„ Dippe, Quedlinburg
„ Braune, Biendorf
„ Sachs
Sugar Works Salvador Gomez, Mexico
Professor Hollrung, Halle
Sugar Works, Maron, Java
Dr. H. Winter, Java
Sugar Works Eilsleben
„ „ Lobau
„ „ Jarotschin
Sugar Refinery Neugebauer, Brieg
Sugar Works Querfurt
„ „ Kreuzburg
„ „ Wetteraue
„ „ Schwoitsch
„ „ Viervalsten (Holl.)
„ „ Klein-Wanzleben
„ „ Wreschen
„ „ Dahmen
„ „ Egeln
Societa Italiana, Genova
Sugar Works Eilenstedt
John A. Sherer, New-York
Laboratory Moeries
Sugar School, Brunswick
Sugar Works Kaliwango, Java
„ „ Barth
„ „ Wegeleben
„ „ Samter
„ „ Dormagen
„ „ Arnswalde
„ „ Stralsund
„ „ Gr. Mochberg
„ „ Stavenhagen
Refinery, Alten
Central Factory, Nauen
„ „ Strassburg
Refinery, Regensburg
Sugar Works, Dahmen
Ystadt
Sugar Refinery Maquet, Magdeburg

b. MEDICAL RESEARCHES etc.

Prof. Dr. Hartwig (Dresden)
General Hospital Moabit (Berlin)
Dr. L. Gebek (Cottbus)
Dr. Ed. Kaiser's Microscopic Inst. (Berlin)
C.F.Kahlbaum chemical works (Berlin)
Dr. Kühn, Bad Neuenahr
Red Cross, Berlin
G. Menschel's Apothecery, Metz
Counseller Wiede (Bockwa)

II. Calorimeters.

Royal techological Museum (Hungaria)
Prof. Dr. Hagemann, Agricultural College (Bonn)
University (Berlin)
Prof. Wanmann, University Giessen
Gasworks Berlin
Dr. Staedel, Polytechnical High school Darmstadt
Carbonit Works, Ltd., Schlebusch
Keramic Laboratory, Berlin
St. Petersburg Metal. Works, Russia
Prof. Lehmann, Agricultural High-school Berlin
Electricity Works, Berlin
Engineering Laboratory, Charlottenburg-Berlin
Laboratory Struess, Kopenhagen
„ Komoll, Danzig
„ Gebek, Cottbus
Prof. Tangl, Accademie, Budapest
Engineering Works Titzner, Russia
Alberti & Hempel, Magdeburg
Gasworks Charlottenburg
Sugar Works Pelpin
„ „ Ugrojeto (Russia)
Sugar Refinery Lumy „
Sugar Works Kianize „
Town Council, Odessa „
Sugar Works, Stralsund
Steam Users Assoc., Magdeburg
Sugar Assoc. Laboratory, Berlin
Sugar Refinery, Dessau
„ „ Hildesheim
Sugar Works, Opalenitza

etc. etc.

Prices for Modern Polariscopes & Calorimeters guaranteed reliable for all climates.

Pos.	Code words (beginnings)		Bung	Bund	Burd	Burg	Code words (endings)
1	Instruments:		Complete with all spares, lamp, tubes, rings & glasses	Instrument only	Complete instrument for technical purposes	Complete instrument special make for colleges etc.	—
2	**Standard-Polariscope** 200 mm for any light	£	23·16·—	19·—·—			hole
		$ gold	116·00	92·70	—	—	
		franc	603·00	482·70			
3	Special-Make **Standard-Polariscope** 400 mm for any light	£	37·18·—	33·2·—			ling
		$ gold	184·90	161·50	—	—	
		franc	960·50	839·00			
4	**Standard-Polariscope** for Cane & Beet analysis; 0°·35°	£	13·9·—	10·17·—			some
		$ gold	65·60	52·90	—	—	
		franc	340·80	274·80			
5	**Standard-Polariscope** for sugar & masse-cuites; 80°·100°	£	12·9·—	9·17·—			rave
		$ gold	60·70	48·00	—	—	
		franc	315·00	249·40			
6	**Mitcherlich-Polariscope** for sodium light	£	6·12·—	5·8·—			etta
		$ gold	32·20	26·35	—	—	
		franc	167·10	136·80			
7	**Standard-Medical-Polariscope** for any light	£	11·10·—	9·2·—			ness
		$ gold	54·10	44·40	—	—	
		franc	291·40	205·30			
8	**Standard-Calorimeter**	£			23·15·—	38·15·—	calo
		$ gold	—	—	115·80	189·10	
		franc			601·60	981·80	

All Prices include packing for sea-transport and delivery f. o. b. Hamburg.
Quotations are subject to the fluctuations of the market.

Terms:—Net cash on delivery against shipping documents or special terms.

BERLIN: (B. P. A.) - C. 2.

GEO. STADE.

Geo. Stade, Civil-Engineer, **Berlin: (B. P. A.) - C. 2.**

Technical Departments for Sugar Works & Distilleries, etc.

I: CANE & BEET SUGAR MACHINERY of any capacity; construction & reconstruction of Beet & Cane-Sugar works; Modern Refineries with or without charcoal; Boiler Houses for bagasse or coal (Freitag's coal dust firing); Boiler Feed Pumps for boiling hot water. Arrangements of sugar houses with Patent Pans yielding within 12 to 72 hours (according to quality required) in one or two products all commercial sugar complete from masse-cuites and refuse-. molasses — no more tanks, consequently great economy in labour and fuel, absolute cleanliness. Electrically, water-driven & Express Centrifugals. Boilers, Engines & Pumps for all purposes of highest efficiency. Mechanical Filters, Superheated clarification; Bagasse-Furnaces; Evaporating Pans of newest type. Own Patents & System for extracting sugar from canes; Centralisation of all Machinery with electric motion; Automatic Lubrication; Cane Factories working without other fuel than Bagasse. Granulators for white sugar, etc. Express-Pumps

II: RUM DISTILLERIES — SPIRIT REFINERIES. Own System & Patent for fermenting molasses; ventilated fermenting rooms-highest yield possible; Automatic Stills & Rectifiers with Fusel Oil separation. Central Pumping Engines.

Factory built: THE WEST INDIA RUM REFINERY, BARBADOS, etc.

III: STORES; FITTINGS; IMPLEMENTS: Railway material; steam-ploughs; complete work shop arrangements; Boiler-Fittings, Cocks & Valves (never leaking ones a speciality). Compositions for steam-pipe covering; Lighting arrangements of buildings (electric, acetylene, gas); India Rubber; Durit packing & hose (superior to asbestos & rubber, per cwt. £ 22 = $ 107); Registering instruments i. e. — Thermometers (£ 12 = $ 58) — Pressure Gauges (£ 7 = $ 34). Control meters for liquids (£ 30 = $ 146); Brasmoscopes for exact boilings of masse-cuites (£ 9 = $ 44); Experimental Centrifugals for steam, electricity & hand (£ 5 to 26 = $ 25 to 126); Experimental Filter-Presses (£ 6 = $ 30); Automatic registering scales for Sugar (bag filling & sewing), Liquids, Beets etc. (from £ 23 = $ 112); Automatic lubricating pumps (£ 5 = $ 25). Steam Regulators — no reducing valves — guaranteed thoroughly reliable (from £ 5 to 50 = $ 25 to 243). Manures & chemicals at wholesale prices.

IV: LABORATORIES; INSTRUMENTS; ANALYSES: Complete installations i.e.:

A: (Code word "Liebig") to suit the wants of small Factories . . . . . £ 30 = $ 146 — f. o. b.

B: (Code word "Howard") for control of large sugar works . . . . . £ 65 = $ 316 — f. o. b.

C: (Code word "Pasteur") for Central Factories with Distilleries . . . . . £ 85 = $ 413 — f. o. b.

D: (Code word "Robert") with implements for soil & manure analysis . . . . . £ 125 = $ 607 — f. o. b.

Special combinations promptly attended to.

Reconstruction of old Polariscopes into guaranteed "Standards"
— at moderate prices —.

New Patent Polariscopes . . (from £ 8 to 50 = $ 39 to 243);
Microscopes . . . . . (from £ 5 to 100 = $ 25 to 485);
Chemical & technical Balances (from £ 5 to 50 = $ 25 to 243);
Ice machinery for laboratories (from £ 15 to 50 = $ 73 to 243);
Beet disintegrators . . . . (from £ 5 = $ 25);
Meteorological Instruments . (from £ 10 = $ 49);
Standard-Typewriters with full visible writing £ 24 = $ 117.

V: REPORTS; CONSULTATIONS; PATENTS. Estimates for machinery and Processes for Cane & Beet Sugar Manufacture & Refining and Distilleries supplied to order at shortest notice. Patents attended to for all countries.

VI: REPRESENTATIONS; AGENCIES, temporary or permanent, undertaken for the Continent or Abroad.

Charges:

According to tariff of "Associated G. Architects & Engineers Union", — (no commission, all discounts credited); or Special Terms. —

TELEGRAM: -

PARIS-EXHIBITION, 18. AUGUST 1900.

GEO. STADE, BERLIN, C. 2.

"STANDARD POLARISCOPES RECEIVED

HIGHEST MEDALS."

DR. FERDINAND G. WIECHMANN, Brooklyn, the chief chemist of The American Sugar Refining Company (Trust), New-York, the well known authority on Sugar analysis and member of The International Commission for Uniform Methods of Sugar Analysis, says about our instruments in a paper put before the Paris Congress: —

Solutions of a pure sucrose prepared at various temperatures and polarized at the temperatures at which they have been prepared, will return identical polarizations.

Confirmatory evidence of the justice of this claim has furthermore been secured by the writer by means **of a very sensitive and accurate double-wedge compensation saccharimeter,** a half-shade instrument, built to order by Julius Peters, of Berlin, (Geo. Stade, Civil-Engineer, Berlin C. 2, General-Agent).

This saccharimeter was examined and certified to as correct by Professor Dr. A. Herzfeld, Director of the Chemisches Laboratorium, *Verein der Deutschen Zucker-Industrie.*

One of the special and, **it is believed, unique features of this instrument is the device whereby its quartz wedges are mounted without wax or cement; they are held in place by delicate plates and plate-springs and thus escape all danger of stress which may be induced by variations of temperature and which may lead to very serious errors in the results obtained in such instruments.**

DR. FERD. G. WIECHMANN,

„The Question of temperature-influence on the „specific rotation of saccharose, 1900, page 32.

The

Dynamic and Caloric Balance

of

a Cane Sugar Factory

and the

Standard-Calorimeter.

By

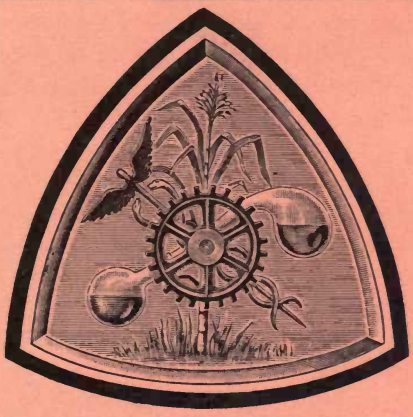
GEO. STADE,

Civil-Engineer & Technical Chemist,

Expert in Sugar & Spirit Manufacture & Refining,

Formerly Officer of the Imperial Patent Office (Berlin); Correspondent of all leading Sugar Journals; Technical Adviser and Director of Sugar Works, Distilleries, and Experimental Stations.

Memb. Assoc. G. Engineers; Fellow G. Chemical Society; Memb. Union Sugar Technologists.



Technical Departments for Sugar Works & Distilleries etc.
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Introductory Remarks: —

To estimate the efficiency of the machinery of any sugar factory from the engineering point of view, firstly, the consumption of power, secondly, the distribution and quantity of the heat required, and thirdly, the operative effect of the boiler-house, are the most important items to be taken into consideration. The chemical control of the sugar department is considered to be a matter of course in modern sugar houses. No responsible sugar manufacturer would feel at ease at the present day without his weekly chemical balance showing the quantity of saccharose entering into working operations, the yield obtained, and the losses sustained in proportion to the same saccharose taken charge of. While this thorough rigorous control is exercised with regard to everything in connection with the sugar, the same attention is very often not paid to the dynamic and the very important caloric balance, giving quantity and quality of fuel entering, of heat generated, used, and lost, from the boiler-house to the sugarloft, &c. Only in case this is done, *i.e.*, when the fuel is weighed and analysed, the feed-water is determined, the account is kept of the temperatures, &c., for water, steam, and refuse-gas (by registering instruments whose bulletins show pressure or temperature at any given moment) and the working of the engines, &c., is controlled by diagrams; only in this case is it possible to find out systematically where improvements are possible and beneficial, and where losses can be avoided or reduced to a practical minimum. Many important financial questions can then be solved without relying on mere guess; such, for instance, as the way of improving the steam-generating system, whether by putting up new boilers or by remodelling the old ones, which will be clearly indicated in most cases. Perhaps it may be useful here to show in round figures, of course without claiming absolute correctness, how the use of power and heat is proportioned in the three different types of sugar-works which have to be taken in consideration here, leaving aside antiquated machinery and plants, such as those on muscovado estates and where single crushing only is used. We will suppose that all three systems are working continuously at full power; superheat clarification and extracting all possible available sugar from molasses being the basis, but distillation not included. The canes are supposed to contain 14 per cent saccharose, the engines to be single acting, the evaporation pans to be kept clean as usually practised in well-conducted sugar houses. The double,

triple or multiple-effets must also either be boiled out regularly once a week with acid and alcali, or (better and simpler) the tubes should be kept clean ***by means of the interfiltration of the semiconcentrated*** juice over sand; for this purpose the standard sand filter recommends itself by its close and compact type of construction. The last method of cleaning is, of course, preferable to the expensive boiling out, particularly as it ***prevents incrustation from even beginning.*** Consequently it largely increases the evaporating power, and besides it keeps the works going all the time—a most important item for the steam generating department.

Power required: —

POWER REQUIRED in Effective Horse Power, per 100 Metric Tons of Canes.

Table A.

	SYSTEMS.		
	Double Crushing. Triple Effet.	Maceration. Quadruple Effet.	Diffusion. Quintuple Effet.
Juice extraction	43	65	29
Evaporation	10	12	14
Granulation	12	14	15
Curing house, &c.	8	10	11
Total horse power required (effective) ..	73	101	69

Steam required: —

STEAM REQUIRED (per 100 Metric Tons Canes) in kilogr. per hour, reduced to a pressure of 6 kilogr. per sq. cm.

Table B.

	SYSTEMS.		
	Double Crushing. Triple Effet.	Maceration. Quadruple Effet.	Diffusion. Quintuble Effet.
Power generation	167	259	161
Heating	279	352	450
Evaporation	505	449	508
Granulation	567	611	735
Total steam required at 6 kg per sq. cm in kilograms per hour	1518	1671	1854

These figures show, approximately, what power and how much steam are required, under given circumstances. As material for generating steam a well established factory only needs the bagasse, and the works are arranged in such a way that neither wood nor coal is necessary when the machinery is in full swing.

Standard Calorimeter: —

The caloric value of the bagasse in the table below is calculated on the basis of the analyses made with the ***Standard Calorimeter***, see Fig. 6.*) In former days the elementary analysis was made use of for the determination of the caloric value of any material, calculating the percentage of carbon, hydrogen, oxygen, etc., according to Dulong's formula. This method, however, has now proved to be destitute of any good basis and gives defective results, particularly with such fuels as wood, bagasse, and lignite, and besides taking too much time for practical purposes, requires complicated instruments and is therefore out of place in factories and such like places. However, it is evident that the caloric value of a fuel being unknown, any efficient estimate as to its real merits is as impossible as it is to judge a cane or beet variety without knowing the percentage of sugar it contains; consequently, ***for the control of the boiler-house the Standard Calorimeter is as indispensable as the polariscope is for the control of a modern sugar-house.*** Now

*) see catalogue.

this new calorimeter gives, in the same comparatively quick way as the polariscope, exact figures, which have been proved by the highest authorities (Berthelot, Scheurer-Kestner, Meunier, Bunte) to be more reliable and more suitable for practical purposes than the elementary analysis above mentioned.

The apparatus consists of the Calorimeter as shown in Fig. 6,*) which is fitted up with an exact thermometer, (B) divided into $1/100^0$ Centigrade—readings of $1/1000^0$ C. are possible with the glass, (A) and the mixing arrangement C D. The Bomb, Fig. 7,*) contains the material to be analysed (F) and the connection for oxygen (K) and the electric wire for the combustion, A B. All that is necessary in addition to this is a chemical and technical balance as used in laboratories, and the analysis can be made by any chemist. For factories, commercial laboratories, and experimental stations this calorimeter cannot be too highly recommended, particularly as the prices of the new instruments are very moderate, and it is infinitely superior to the less reliable and more complicated old systems working in the open air.

Caloric Value of Bagasse: —

Table C.

GREEN BAGASSE RESULTING FROM	100 tons cane give fuel.	100 metric tons fuel contain			One kilogram fuel contains metric units of heat.	Per 100 metric tons cane.	
		Water.	Fibre.	Sac-charose.		Metric units of heat theoretically available.	Value of bagasse in form of coal of fair average quality.
	Tons.	Tons.	Tons.	Tons.			Kgr.
Double Crushing	28	46·3	39·3	8·9	1760	49'280,000	7040
Maceration	28	50·0	39·3	5·4	1600	44'800,000	6400
Diffusion .. .. (Exhausted Chips)	22	50·0	50·0	?	1870	41'140,000	5880

It would further seem to be useful as a criterion of the progress possible by means of improvements in Bagasse Furnaces in connection with the boiler arrangements, to indicate the limits up to which results from a proper technical application of the bagasse as fuel can reasonably be expected. The following table, D, is calculated to show, in conjunction with the foregoing figures, how far economy can be carried out. In this case also absolute figures are not supposed to be given, but those obtained will probably be found sufficient to afford an approcimate indication under given conditions.

*) see catalogue.

Possible Efficiency of Boiler House Plant.

Table D.

TYPE OF FACTORY WORKING WITH.	PER 100 METRIC TONS OF CANE.							
	Useful effect of Boiler Plant, 60% theoretical yield.		Useful effect of Boiler Plant, 65% theoretical yield.		Useful effect of Boiler Plant, 70% theoretical yield.		Useful effect of Boiler Plant, 75% theoretical yield.	
	Metric units of heat obtained in form of steam.	Steam of 6 kg sq. cm available per hour.	Metric units of heat obtained in form of steam.	Steam of 6 kg sq. cm available per hour.	Metric units of heat obtained in form of steam.	Steam of 6 kg sq. cm available per hour.	Metric units of heat obtained in form of steam.	Steam of 6 kg sq. cm available per hour.
	Cal.	Kilogr.	Cal.	Kilogr.	Cal.	Kilogr.	Cal.	Kilogr.
Double Grushing.—Burning green bagasse	29'568,000	1876	32'032,000	2030	34'496,000	2187	36'960,000	2344
Maceration.—Burning green bagasse	26'880,000	1705	29'120,000	1847	31'360,000	1989	33'600,000	2131
Diffusion.—Burning completely exhausted bagasse	24'684,000	1565	26'741,000	1679	28'798,000	1826	30'855,000	1941

Technical Departments for Sugar Works & Distilleries, etc.

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REPORT ON THE GENERAL MEETING OF THE ASSOCIATION OF GERMAN SUGAR MANUFACTURERS 1902.

Journal des fabricant de sucre, Paris 1902, 41.

The Standard Sand Filter in Hawaii: —

In placing an order for 18 filters the Honolulu Iron Works Co. express themselves as follows: —
"These filters are particular suitable for the Cane Sugar Industry." 10. OCTOBER 1901.

We beg to say that those supplied to the Puunene Mill and to the Honolulu Plantation Co. eighteen in all have given entire satisfaction. We inclose you herewith testimonial from the Manager of the Honolulu Plantation Company who is particularly well pleased with his installation.

HONOLULU, T. H., JULY 24, 1902. HONOLULU IRON WORKS CO.

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AIEA, OAHU, T. H. JULY 23, 1902. Manager's Office.
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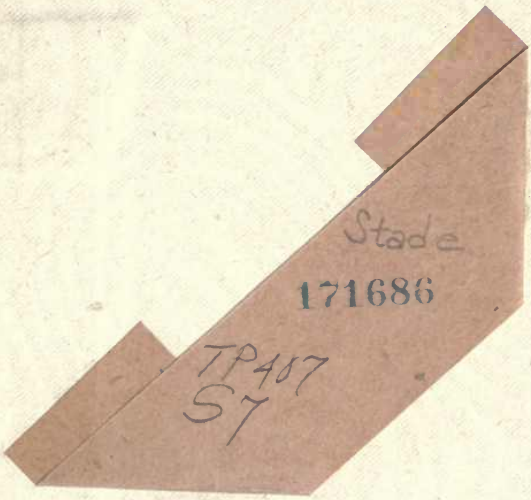

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